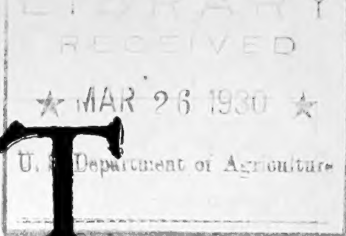


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FOREST WORKER



January, 1930

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Announcements

Twelfth Southern Forestry Congress

The Southern Forestry Congress will hold its twelfth annual session in Memphis, Tenn., April 10-12. As secretary of the congress, R. S. Maddox, State forester of Tennessee, is arranging the program. Headquarters will be at the Peabody Hotel.

Pan American Agricultural Conference

The Inter-American Conference on Agriculture, Forestry, and Animal Industry to be held at Washington, D. C., in 1930, plans for which were initiated under the auspices of the Pan American Union, has been taken

over by the United States Government. Congress has been asked for an appropriation for the meeting, and the President, through the State Department, is to invite the other Pan American countries to send delegates. The conference has been postponed to September. The purpose of the meeting is to discuss and formulate practical means of international cooperation looking toward the most effective and orderly utilization and conservation of agricultural, forest, and range resources of the independent countries of the Americas, with special reference to the Tropics. It is expected that forest and range resources will occupy a prominent place in the deliberations of the conference.

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State Forestry

Pennsylvania Buys 132,000 Acres of Forest Land

By a single purchase recently closed the State of Pennsylvania has enlarged its forest land holdings by 132,000 acres. This total will be allocated on the basis of 70,226 acres to the department of forests and waters and 61,910 acres to the State game commission. The land is located in 11 counties. It was purchased from the Central Pennsylvania Lumber Co. at \$3 per acre. Acquisition expenses bring the total cost to considerably more than \$400,000.

New York Amends Constitution to Provide for Emergency Funds for Fire Suppression

As a result of votes cast in the fall election of 1929 the New York Constitution now recognizes forest fire suppression as a cause for which the State may justifiably incur debt. Heretofore the constitution has not authorized the State government to borrow money for any purpose other than to repel invasion, suppress insurrection, or defend the State in war. The State's conservation law provides that the comptroller, with the approval of the governor, may borrow as much as \$100,000 for forest fire suppression in any fiscal year of emergency fire conditions; but a question as to the constitutionality of this provision has made it inoperative since 1926. To validate the provision it was necessary to have a proposal for a constitutional amendment approved by two sessions of the legislature and finally approved by a popular vote. The proposed amendment was given enthusiastic nonpartisan support and was approved at the polls by a vote of more than 3 to 1.

Western North Carolina Farmers to Cooperate in Marketing Wood Products

As a step toward the organized marketing of farm wood products in western North Carolina, the Farmers Federation has created a wood products department. The new department is headed by H. Rotha, formerly with the Champion Fibre Co. and the woods depart-

ment of the Eastman Kodak Co. The department plans to handle pulp, extract wood, locust for insulator pins, dogwood for cotton mill shuttle blocks, all kinds of logs for sawmill and veneering purposes, telephone and telegraph poles, and every other type of wood product that western North Carolina farmers may have to sell; to seek to interest wood-working industries in locating in western North Carolina; to encourage reforestation and the production of forest planting stock; and to ship plants such as rhododendron, azalea, and ivy for landscaping purposes.

In purchasing wood products the department will withhold 2½ per cent of the purchase price and credit it to the seller in stock. The capital established in this way will be used to promote the establishment of wood-working plants in western North Carolina.

The Farmers Federation estimates that woodlands occupy 1,811,818 acres of the farms in 23 mountain counties of western North Carolina, and that 183,230 acres of these farms may be classed as cleared but idle. In announcing its new enterprise the federation states that its purpose is "to make the vacant farm lots produce a regular income for the farmers and landowners."

West Virginia Commercial Forestry Conference

West Virginia's forestry problems were thoroughly aired by a large group of economists, foresters, and governmental and industrial executives in the West Virginia Commercial Forestry Conference held in Charleston on December 4 and 5. Held with the assistance of the United States Chamber of Commerce and with full participation by both State and Federal Governments, the conference was characterized by recognition on the part of private enterprise in the State that West Virginia's forest resources are worth looking after.

L. C. Gray, economist in charge of the division of land economics, United States Department of Agriculture, told the conference that the tendency to depopulation of certain sections of West Virginia as a result of the decadence of agriculture and the passing of the timber must not be regarded as a temporary phenomenon. A program of reforestation is imperative, he said, if

prosperity is to be restored to all sections of the State. The meaning of West Virginia's forests to her leading industries and to recreational and other interests of her people was described by a representative of each. Forest fire protection needs, possibilities, and responsibilities was discussed by A. B. Hastings, in charge of the cooperation of the United States Forest Service with State forestry organizations; Franklin W. Reed, forester of the National Lumber Manufacturers Association; and George E. Brooks, secretary of the Southern West Virginia Forest Fire Protective Association.

David G. White, trade extension manager of the Appalachian Hardwood Club, Cincinnati, called attention to West Virginia's large exports of hardwoods and to the economic waste involved in transporting these supplies away from the State to be manufactured at points no more advantageously located in relation to centers of consumption.

State Forester H. S. Newins told the conference that 60 per cent of the area of West Virginia is potential forest land, but that the State's timber, like its coal, has been exploited recklessly and that at present a decline is remarked in the local supply of timber of the kinds desired for use in the mines. W. N. Sparhawk, forest economist of the United States Forest Service, said that whereas second-growth timber in West Virginia, as elsewhere, has been treated rather like a step-child, money is better spent in improving second-growth stands than in planting trees on areas where forest reproduction is lacking.

C. P. Winslow, director of the Forest Products Laboratory, and others spoke on wood utilization, and Newton Thomas, of the Carbon Fuel Co., described the benefits of preservative treatment of wood.

T. C. Townsend, State tax commissioner, declared that it would be impossible to replace the forests of West Virginia on a commercial scale without amending the State constitution so as to permit changing the State tax system.

Banquet addresses, including a talk on "forestry in commerce," by William Butterworth, president of the United States Chamber of Commerce, and a discussion of "forestry as it is" by R. Y. Stuart, Chief of the United States Forest Service, were broadcast.

Resolutions adopted by the conference recommended that the State make use of every facility at its command to follow out intensive forest research, make additional funds available for the extension of its forest-protection system, and acquire land on which to demonstrate forest management to landowners; that the Federal Government provide the full appropriations authorized for forest research under the McSweeney-McNary law, substantially increase funds available for soil erosion study in cooperation with the States with the view of flood prevention, and expand the program of national forest acquisition and development in West Virginia; that private groups and individuals unite with State forces in efforts to bring new woodworking industries

into West Virginia and to amend the State's tax laws so as to make the field more inviting for the location and operation of such industries; that State and private agencies work together for the adoption in West Virginia of methods of forest taxation that will promote timber conservation and reforestation through private enterprise; and that all the State's educational agencies assist in further development of public interest in a sound and complete forestry program.

The conference had its climax in the forming of a permanent organization, the West Virginia Forestry Association. Officers of the new association are: President, John Raine, Rainelle; vice presidents, A. B. Brooks, Wheeling, Mrs. W. E. Chilton, sr., Charleston, and Thomas G. Clagett, Bluefield; secretary-treasurer, Ross Johnston, Charleston.

Detroit News Campaigns for Reforestation

The Detroit News is appealing to citizens of Michigan to take a direct part in reforesting idle cut-over land owned by the State. Telling its readers that the State now owns 1,390,000 acres of tax-reverted land and that land is reverting to the State because of nonpayment of taxes at the rate of 250,000 acres a year, the News presents a special offer authorized by the director of conservation. This offer enables any individual or organization to bring about the reforesting of 40 acres or more of the State's idle land by paying the labor costs of planting, \$2.50 an acre. The State will provide seedling trees for planting and will meet all expenses involved other than that for labor. Donors will be notified of the exact location of the plantings made possible by their contributions, and the plantings will be permanently marked with the donors' names at the expense of the News. Areas planted under this plan are to be set aside as permanent forest reserves, on which the State pledges itself to plant a tree for every one that may be cut in the harvesting of a timber crop or destroyed by fire, insects, or disease.

Potlatch Co. Makes First Application Under Idaho Forest Taxation Law

The first applicant for classification of land under the new reforestation law of Idaho was the Potlatch Lumber Co., which asked to have the provisions of the law applied to nearly 46,000 acres of cut-over land. Individual quarter sections of this land are said to have cut as much as 10,000,000 board feet of white pine. The company has refrained from offering the land for sale as suitable for farming partly because the cost of clearing it is estimated at from \$150 to \$300 per acre and partly because it is subject to frosts throughout the year. Fire protection has been provided by the company through the Potlatch Timber Protective Association.

New York Counties Prompt to Claim State Aid in Reforestation

More than one-third of New York's 62 counties have already taken steps to avail themselves of the State aid in reforestation work for which a law of 1929 provides. Funds appropriated by the counties for forestry purposes amount to \$68,956. If the plans of all the counties applying for State aid in reforestation work meet with the approval of the conservation commissioner and their appropriations are matched with State money up to a maximum of \$5,000 a year for each county, as provided by law, \$53,000 of State money will be paid to the counties for use in establishing county forests. Besides making this financial contribution the State is prepared to supply the counties with free planting stock and with technical forestry advice.

Erie County has appropriated \$21,000 for county reforestation work.

Arkansas Forest Protective Association Meets

At the first annual meeting of the Arkansas Forest Protective Association, held in Little Rock December 10, William L. Hall reported as secretary that the press of Arkansas had given the association good cooperation during the year in handling forestry educational publicity. E. Murray Bruner, of the United States Forest Service, commented on his preliminary findings in a survey of Arkansas forest conditions which had been undertaken at the request of Governor Parnell. Mr. Bruner tentatively estimated the total woodland area of Arkansas at 22,000,000 acres, including 2,000,000 acres in Federal and State ownership. This woodland area represents 65 per cent of the State's total land area. Of the total woodland area in private ownership his data indicate that 32.5 per cent is in holdings of 1,000 acres or more. From 1,000,000 to 3,000,000 acres of cut-over land has been rendered desolate and practically worthless as the result of annually recurring fires. Organized action by the State, Mr. Bruner declared, is absolutely essential to adequate protection of Arkansas forest lands from fire. The responsibilities of the State government and those of the general public and the private landowner in relation to forest fire protection were discussed by A. B. Hastings, of the United States Forest Service.

The supervisors of the Ozark and Ouachita National Forests, Ark., reported that although the fire season of 1929 was one of the worst on record less than 2 per cent of the Government-owned land included in these forests had been burned over during the year. It was brought out that the fire score had been held to almost equally low figures on certain private holdings in the State, although on other holdings the proportions burned over ranged as high as 15 per cent.

The association agreed to sponsor a bill to be presented to the general assembly of the State at its next

regular session, in 1931, providing for the creation of a forestry commission of five members, which would employ a State forester. The proposed commission would consist of the commissioner of mines, manufacture, and agriculture, the dean of the agricultural college of the University of Arkansas, one lumberman landowner, one wood-lot farmer, and one United States forester. In another resolution the association called on the people of Arkansas to consider carefully the problem of restoring forest lands in the State to a high degree of productiveness so that they may bear their share of tax burdens and may continue to provide forest products needed by the people and to sustain a large group of industries.

Railroad Does a Good Safety Strip Job by Proxy

In the Gallitzin forest district of Pennsylvania, headquarters of which are in the city of Johnstown, the proportion of forest fires caused by railroads decreased strikingly in 1929. This change is attributed by District Forester T. I. Shirey to an agreement by which the Pennsylvania Railroad arranged to have him do at its expense whatever safety-strip work he thought was needed on its lines within the district.

In the 10-year period 1916-1925 railroad-caused fires composed 28 per cent of the fires occurring in this district. In 1927, despite weather conditions especially unfavorable to fire, they made up 34 per cent of the total. In 1928, under an agreement whereby section gangs of the railroad worked on safety strips in spare time under the direction of State forest inspectors, railroad fires were reduced to 20 per cent of all. This arrangement was found unsatisfactory in that it was difficult to get the men to understand what they were to do, the short hours during which the gangs were available for the work were grouped in the middle of the day when burning was dangerous, too much time was lost in transportation, and costs were high. Under the arrangement agreed upon for 1929 forest inspectors hired a crew to do the safety-strip work under their direction, the railroad paying the wages of the crew, paying for the time and expenses of the inspectors, and also taking responsibility in case of injury to the men or of damage to property from the escape of fire. Inspectors and crew spent the mornings of wet days in preparing strips, cutting out logs and trimming brush, and raking a clean, wide backstrip. Burning was usually done late in the day. The season's work cleaned up more than 70 miles of the most hazardous safety strips in the district. The few forest fires that occurred before this work was finished caused no serious damage, only one serious railroad fire occurred in the district (this was on a division where no safety strip work was done), and railroad-caused fires constituted only 7 per cent of the district's total for the year.

New Hampshire Fire Score Low Despite Drought

In spite of the severe drought experienced in 1929, the woodland area covered by fires in New Hampshire during the year was 63 per cent below the 10-year average. It totaled 2,200 acres. The number of forest fires occurring in the State during the year was 525, or 90 per cent of the 10-year average. Only 63 fires burned more than 10 acres and only 6 burned more than 100 acres.

As in previous years, the burden of blame for causing forest fires rested most heavily on careless smokers. Reports to the State forestry department charged smokers with causing 210 fires, which accounted for more than half the burned area. Railroads appeared to be responsible for 166 fires, brush burners for 54; 16 fires were declared to be of incendiary origin. Lightning started 11 fires, camp fires started 10. The forestry department acknowledges especially fine cooperation in 1929 on the part of lumbermen; although 402 separate portable sawmill settings took place in the State during the year, 186 of which were by steam mills, only 5 forest fires were reported as starting from lumbering operations.

Fire Protection Gains in Michigan

In 1929 the forest-fire division of the Michigan Department of Conservation achieved the best record of its history in suppressing fires on State and privately owned land. Although the season was unusually dry and almost twice as many fires were reported as in 1928, about 25 per cent less acreage was burned over than in that year. The fires of 1929 burned over 50,985 acres of land, the average fire covering 20.8 acres. The areas burned over included 27,597 acres of second-growth and cut-over timberland and 23,388 acres of grass plains, swamp, and hay and pasture land. Records of the forest-fire division as to the causes of the 2,450 fires reported are as follows: Smokers, 968; railroads, 326; camp fires, 143; lightning, 25; brush burning, 356; incendiary, 121; lumbering, 59; miscellaneous, 252; unknown, 200.

Between fires the State fire wardens and their assistants found time to construct 14 district headquarters buildings, complete 201 miles of fire line and start work on 74 miles in addition, and add 68 miles to the existing 389-mile telephone system of the division. Five new fire towers were erected in the State during the year.

Specially Designed Truck Ready for Fire Fighting on Long Island

The five new fire trucks which the New York Conservation Department has ready for use in the spring fire season include one specially designed to fit conditions existing on Long Island. Fires on Long Island are very numerous and spread with great rapidity over large areas of oak and pine brush; and in the portions of the island that are subject to forest fire water is not plentiful. The truck is designed for high speed and for a heavy load. It carries a 350-gallon water tank, 6 knapsack pumps, and tools for a crew of 25, and has space for transporting 10 men. A pump driven by power take-off from the transmission will take water directly from the tank through $\frac{1}{2}$ -inch hose, or may be used for pumping a $1\frac{1}{2}$ -inch stream from a cistern or other source. Both $\frac{1}{2}$ -inch and $1\frac{1}{2}$ -inch linen hose are carried on the truck.

Five new gasoline-driven fire-fighting pumps, each supplied with 1,500 feet of linen hose, were added to the department's equipment during the past year. The department now has 57 pumps of this type. It has 2,000 knapsack hand pumps, of which 850 were acquired in 1929. All pumps more than a year old have been completely overhauled during the winter at the department's Saranac Inn shop.

Tree Planting Suggested to Mark Massachusetts Tercentenary

The Massachusetts Forestry Association proposes to celebrate the tercentenary of the founding of the Massachusetts Bay Colony with a revival of shade-tree planting. Recently the association made a survey of the shade-tree situation in the State, and obtained very discouraging results. Many towns, it reports, have completely neglected for 10 years or more to carry on the planting which, as practiced by earlier generations, has been responsible for the prized beauty of many Bay State roads and streets. Urging that 100,000 shade trees be planted in the State in 1930, the association points out that if each town and city plants one tree for each of the 300 years this quota will be more than filled. It is suggested that communities unable to buy nursery trees use wild stock, as many Massachusetts wardens have done with good results and at an expense of less than \$1 per tree. The association offers prizes of \$500, \$300, and \$100 to the three towns or organizations that make the most successful half-mile street or roadside plantings, on condition that at least 10 towns or organizations enter the contest.

Soil Sterilization Gives Good Results in Pennsylvania Nursery

● Sterilization of seed-bed soil by steaming has reduced weed growth by about 75 per cent and apparently has eliminated all damage to seedlings from white grubs and damping off, in experiments carried out at the Greenwood State Forest Tree Nursery of Pennsylvania. The saving on weeding costs is believed to have covered the cost of the treatment, leaving as clear gain the removal of the two foremost causes of injury to seedlings in the nursery. When second crops have been sown on the treated soil very favorable results have ensued, District Forester T. Roy Morton reports.

In these experiments, which were made on 4-foot seed beds, steam was applied to the soil by means of a steam-tight pan 12 feet long, 4 feet wide, and 1 foot deep, made of 12-gage black iron. The top of the pan was reinforced with angle iron and had a flange for a pipe in its center. A 7-foot handle was placed crosswise at each end for moving the pan. When a seed bed had been prepared as for sowing the pan was placed on it and steam was carried to the pan by means of a ¾-inch pipe from a 20-horsepower steam traction engine having a boiler pressure of from 80 to 110 pounds. Steam was passed into the pan for at least 30 minutes, and the pan was left in place for an additional 30 minutes. Duplicate pans were used alternately.

During the fall of 1925, 4,144 square feet of soil was sterilized. Wet weather interfered with the work, and the cost averaged \$2.40 per 100 square feet. In the spring of 1926, 9,000 square feet of soil was steamed at an average cost of \$1.39 per 100 square feet. In the spring of 1927 the experiment was continued with the sterilization of 11,136 square feet of soil at a cost of \$1.53 per 100 square feet. Adjacent to each of the sterilized areas check plots were left unsteamed.

In seeding the steamed beds northern white pine seed was used in 1925, Norway pine and Japanese larch in 1926, and northern white pine, Norway spruce, and Norway pine in 1927.

In every case comparison of steamed and unsteamed beds in the first year after steaming showed about 75 per cent fewer weeds present in the former. No damage from white grubs was noticeable on the steamed areas, while on the unsteamed areas as many as 25 per cent of the seedlings showed injury from this cause. No damage from damping off was visible on the steamed areas.

The seedlings planted on sterilized soil are now from one-fifth to one-fourth larger and have a better color and a more even stand than seedlings of the same species on the unsterilized soil. It was found that seed of quick-germinating species such as Norway pine, pitch pine, and spruce should not be planted until a week or 10 days after steaming, although northern white pine could safely be sown as soon after steaming as it was possible to work the ground.

Georgia Successfully Repeats its Forest Fair

The State forest fair held at Valdosta, Ga., in November, 1929, repeated the success of that held in the preceding year at Waycross, Ga. The first day was featured by opening addresses, the second by talks on forestry in the schools; the third was naval stores day. In a nearby forest representatives of the Georgia Forest Service, the Georgia School of Forestry, and the United States Forest Service showed visiting timber owners approved methods for establishing and operating forest nurseries, planting seedlings, thinning timber, constructing firebreaks, estimating timber, and chipping pines for naval-stores production. Methods of protecting and utilizing the Georgia pines were further illustrated by an array of exhibits. The 50 exhibitors taking part in the fair included with the Georgia Forest Service several Federal bureaus, the Georgia School of Forestry, various lumber associations and forestry associations, naval stores dealers, and manufacturers of equipment used in forestry, lumbering, and the utilization of forest products.

Michigan Game Sanctuaries

Game sanctuaries in Michigan now aggregate 129,807 acres. The seven State-owned "standard" refuges, in which all game is protected, total 58,000 acres. These have year-long caretakers and are protected by fire lines and fire towers. Added to them are the 64 State parks, comprising 25,384 acres on which hunting is prohibited; other areas set aside by the legislature or by the conservation commission; and about 256 individual units of privately owned land, totaling nearly 50,000 acres, that have been dedicated as sanctuaries by their owners and placed under State protection for specified terms of years. Michigan's present wild life sanctuary law permits the dedication of privately owned areas of from 20 to 1,500 acres for periods of five or more years, and permits the owner of such an area to reserve the right to hunt or trap certain kinds of game.



Etowah County, Ala., recently entered into an agreement to cooperate with the State, and through it with the Federal Government, in the promotion of forestry on nonagricultural lands. Four Alabama counties had previously taken such action. The county of Mobile has made an annual appropriation of \$2,500 as its contribution toward the cost of the work. A major feature of the cooperative effort is general educational work in forest protection.

Boxelder Seed Collected by Red Squirrels

Some North Dakota red squirrels prepared a surprise for seed pickers of the State forest nursery in 1929 when they stored up quantities of boxelder seed as an article of winter diet. They collected the seed from large native trees growing along the banks of Oak Creek, which flows out of the Turtle Mountains. When the first cache of about a bushel of seed was found packed in between the trunks of a clump of boxelders it was credited to the wind; but when the second, found at the base of a large ash, was more closely examined it was found that the small twigs had been cut rather than broken. Other caches were found about 20 feet above the ground in crotches of boxelder and willow trees and in the hollow butt of an elm. Bur oak acorns and green ash seed, crops of which were heavy in 1929, apparently failed to attract the squirrels as an alternative to the boxelder seed.



The will of Foster M. Voorhees, late ex-Governor of New Jersey, gives the State 323 acres of rolling hill country in Hunterdon County to be used for forestry and conservation purposes. The land, on which Mr. Voorhees had made his home for a number of years, is situated about a mile north of High Bridge on the Schooley Mountain Road. Under the name of Voorhees State Park, it is to be maintained as a forestry demonstration area, with some development also as a public recreation area.



The theory that privately owned land may be condemned by the State for State park purposes is sanctioned by a recent decision of the Michigan Supreme Court. This decision upholds a verdict from the Lenawee County circuit court granting to the State 86 acres of land adjoining the Cedar Hills State Park at the price of \$35,000. The State had offered \$30,000, but the owner had demanded \$125,000.



The opening of a new district forester's office at Swainsboro, Ga., is announced by State Forester Lufburrow. Jack Thurmond, a forestry graduate of the Georgia State College of Agriculture, has been appointed to take charge of the office.

Addition to People's Forest at Barkhamsted, Conn.

A valuable addition to the People's Forest in Barkhamsted, Conn., is being made through the action of Mrs. G. E. Matthies and family, of Seymour, in giving the State 210 acres of land at the southern boundary of the forest. This forest, located on the west branch of the Farmington River, has come into State ownership entirely through a series of gifts. At present, with an area of about 1,600 acres, it represents more than 300 gifts of money and land from individuals and organizations.

Connecticut State Forest Administration Reorganized

Since November 1 the State forests of Connecticut have been administered in two districts. District Forester S. E. Parker has charge of the western district, including all forests west of the Connecticut River except the Cockaponset, and District Forester Joseph B. Pike, jr., has charge of the eastern district, including all the forests east of the river. The Cockaponset Forest of 7,690 acres remains under the care of George W. C. Turner, whose title is changed from district forester to silviculturist. State Forester Hawes intends to use this forest for silvicultural experiments and also as a demonstration area.



At the 1929 Mississippi State Fair the State forest service displayed photographs and wood sections of 24 common trees of the State and invited young people between the ages of 6 and 18 to compete in giving information on the trees shown. A form was provided for the use of contestants. A prize of \$10 and one of \$5 were provided. The same amounts were offered as prizes to the two young persons who should submit the best posters depicting reasons why Mississippi should practice forestry.



In 1929 the forestry division of the Michigan Department of Conservation planted 9,157,600 pines on the State forests, reforesting 17,596 acres. The planted acreage was the highest for any year of the division's history.

Education and Extension

Gifts of Money and Land to Yale School of Forestry

Three lavish gifts received by the Yale School of Forestry early in the new year have greatly enlarged the school's facilities both for training students and for demonstrating practical forest management. Charles Lathrop Pack has added \$125,000 to the \$200,000 foundation he established for the school in 1929; Mr. and Mrs. Starling W. Childs, who have in the past given large support to the endowing of the Yale Natural Preserve and to other university enterprises, have added \$100,000 to the school's endowment; and George Hewitt Myers, donor of the Yale Forest at Keene, N. H., has transferred to the school 8,000 acres of forest land in northeastern Connecticut.

The new school forest is located in the towns of Union, Ashford, Eastford, and Woodstock. Dean Graves's announcement of the gift calls attention to the fact that the forest is large enough for a practical operating unit and for the demonstration of many features of forest management. The land has been protected for many years and is well stocked with hardwoods, pine, and hemlock. Enough merchantable timber is present to permit economic forestry operations to begin at once. The educational phases of the work on the forest will be developed progressively as administrative details are perfected.

Nathan D. Canterbury, who is a member of the 1922 class of the Yale School of Forestry and who has served as assistant State forester and State forester of Louisiana, has been appointed director of the forest.

The income from the amplified Pack Foundation will be used in part for work on the new forest, in part for investigative work in features of applied forestry, and in part for cooperative and general educational work among forest owners.

New York Ranger School Forest Enlarged

The International Paper Co. has given 500 acres of land to the New York State College of Forestry, as an addition to the school forest of the New York State Ranger School, Wanakena, N. Y. Officials of the college have the privilege of choosing which 500 acres of the company's holdings adjacent to the school forest shall constitute the gift. With this addition the ranger school forest will have a total area of 2,350 acres.

Pack Forestry Foundation Established in University of Michigan

As a memorial to his father, George Willis Pack, Charles Lathrop Pack has established in the University of Michigan a forestry foundation of \$200,000. The income from this fund is to be used by the university for the promotion of practical forest land management. Part of it will pay salary and expenses of an experienced forester to be known as the George Willis Pack professor of forest land management. In accordance with Mr. Pack's wishes it is intended that this forester shall devote his efforts principally to woods work rather than to classroom activities. The two major purposes to which the income from the fund will be devoted are the development of wild lands owned by the university and efforts in cooperation with landowners to bring about better forestry management of privately owned lands.

University lands eligible to be placed under management in pursuance of Mr. Pack's suggestions include the Chase S. Osborn preserve, presented to the university last fall by ex-Governor Osborn. This tract, comprising some 3,000 acres of Sugar Island, in the St. Mary's River, was burned over perhaps 50 years ago and is now well stocked with second-growth timber representing a wide variety of both hardwood and softwood species. It is much in need of clearings, thinnings, and improvement cuttings, Dean Dana says, and can be used to excellent advantage for research and demonstration. It is well suited in many ways, he adds, for the study of wild life and for recreational use.

Ex-Governor Osborn's gift includes a large log cabin which will serve as headquarters for men working on the tract, and also a library of several thousand volumes among which are a number of first editions and other valuable works relating to natural history. The library is housed in a fireproof building.

Pennsylvania Students Explain Choice of Forestry

When 63 freshmen of the Pennsylvania State Forest School responded to a recent inquiry as to what influence led them to choose forestry as a profession, 16 said that their decision was due to general reading, 17 attributed their choice to the influence of acquaintances or relatives who were foresters or forestry students, and 16 others indicated that theirs had been suggested by high-school teachers and friends. Study of the college catalogue was credited in 5 cases, Boy Scout influence in 3. Of the remaining answers 2 named the United States Forest Service; 2, magazine advertisements; 1, foreign travel; and 1, forest work.

New Hampshire 4-H Forestry Clubs Enroll 1,200

Four-H club forestry work took a long step forward in New Hampshire in 1929, with 1,287 boys and girls participating, Extension Forester K. E. Barraclough reports. Standard forestry club projects were undertaken by 743 of these young people and were completed by 557 of them. During the year club members made 125 leaf and wood collections, improved 423 acres of woodland, and planted 392,050 trees. The State provided the planting stock without charge, allowing 250 trees to a club member less than 16 years old and 500 to a member who had reached that age. The standard 4-H planting project consisted in the planting of 500 or of 1,000 trees, according to whether the member was under 16 years of age.

Pageantry for 4-H Club Camps

A simple camp-fire pageant modeled on Indian ceremonial has been devised by Woodbridge Metcalf, extension forester of California, for use on the opening night of a 4-H club camp. Mr. Metcalf's plan pleasantly and effectively answers the question of how to stimulate a spirit of interest and cooperation in a group of from 50 to 100 boys or girls, for the most part strangers to each other, at the outset of camp activities. The two speaking parts are those of a chief (the county club leader or the man in charge of the camp) and a visiting medicine man (one of the local leaders or the camp manager). Camp members are to take their places according to a prearranged plan around a fire already laid but unlighted. Mr. Metcalf's suggestion is that a fire of moderate size be built in log-cabin style, with three or four courses of light logs about 3 or 4 feet long laid up square and the center filled with light twigs or dry branches. The chief rises to speak of the purpose of the camp and the symbolism of the camp fire and to introduce the medicine man. He then calls on two members of the camp to stand by him ready to assist in the lighting of the fire. The medicine man expresses his good wishes for the success of the "tribe," delivers greetings and good wishes of other tribes met in his travels, and narrates a history of man's use of fire, concluding with a warning of the danger of this great power when it escapes from control. He then addresses individually the spirits of the four winds, asking them to bless the camp. The fire is lighted, and the crowd waits in silence to see it kindle as a sign that the spirits will grant their petitions. A talk by the chief on the purposes and ideals of the camp is followed with the club pledge and a song.

A second pageant, for use on any night of camp, has been written by Mr. Metcalf in which the spirits of forest, earth, water, fire, and music and fellowship are personified. This introduces a more elaborate treatment of forest influences and fire prevention.

Forestry Essay Contest for Tennessee Boys

The University of Tennessee Agricultural Club is offering \$25 in eight prizes and the American Forestry Association, through the Tennessee State forester, is offering medals to Tennessee boys for forestry essays. Any boy who completed a 4-H club project of any kind in 1929 is eligible. Contestants are permitted to choose among the following three subjects: Black walnut, its value, use, and production; black locust for timber and soil reclamation; and how woodlands can be improved for timber. For information they are referred to United States Department of Agriculture Farmers' Bulletins 1392 on black walnut and 1177 and 1071 on woodlands, and to a circular on black locust obtainable from the State forester. The essay winning first place will be published in the Tennessee Farmer, a periodical of the University of Tennessee Agricultural Club. A prize of \$8 and a medal will be awarded to the author, and a medal will be awarded to his school for the ensuing year.



In Rowan County, N. C., where black walnuts were planted on 600 farms in 1928, County Agent W. G. Yeager expects even greater interest in walnut planting to result from a black walnut show held by the extension service at Salisbury in December, 1929. Prizes were awarded for the best and largest walnuts entered, and walnut furniture, walnut wood in the rough, and walnut veneers and panels were exhibited by furniture manufacturers and others. Mr. Yeager has a large group of 4-H club members undertaking to plant 25 black walnut trees apiece and to keep definite records of the trees' growth for five years.



The tree-seed-gathering campaign put on in 1929 by Extension Forester Barrett, of Georgia, brought in 328 pounds of slash pine seed, 90 pounds of loblolly pine seed, and 38 pounds of longleaf pine seed. The \$934 paid to the collectors was provided by the Georgia Forest School. Seed not needed for planting in the State nursery were sold at cost to foresters and farmers.



The New York Legislature has appropriated \$600,000 for a new building for the New York State College of Forestry, Syracuse, N. Y. The new building will be erected near the southwest corner of the building now occupied by the college, facing the stadium.

Arkansas Fair Exhibit Gives Pointers on Fence-Post Selection

A suggestion for Arkansas farmers as to how they can save money by wise choice of fence-post material was embodied in an exhibit prepared by Extension Forester Charles A. Gillett for the Arkansas State Fair of 1929. New posts of 10 different woods were exhibited together with used posts of the same species. On the left were grouped nondurable species, pine, cottonwood, hickory, ash, and red oak. Posts of these species that had been used for from three to five years were entirely rotted off at the ground line. At the right were durable species, black walnut, post oak, black locust, osage-orange, and red cedar. A small sign attached to each post named the species and gave an estimated figure for the average cost of a post of that species per year of use.

An Arkansas Timber Farm

Neither cotton nor grain is being grown on the 1,842-acre farm near Star City, Ark., owned by H. H. Knipe, of Lawrenceburg, Ill., and managed for him by John Bradburn. The owner's plan, which Mr. Bradburn is following out with the help of advice from County Agent W. A. Trussell, is to develop the tract strictly as a timber farm. Most of the area is covered with a splendid stand of loblolly and shortleaf pine. The whole has been fenced, and firebreaks are being constructed. Mr. Bradburn has trails throughout the woods and patrols them constantly during dry seasons. The owner desires to make the farm a timber-growing demonstration, with a system of roads connecting plots on which approved forestry practices are illustrated. He intends to buy a portable sawmill and to cut a certain portion of his timber annually.

Idaho Farmer Profits from Father's Tree Planting

Stanley Mallett, a farmer near Payette, Idaho, is making money in his spare time because his father, 35 to 50 years ago, planted black locusts on odd corners of his farm. Using a small homemade sawmill, Mr. Mallett manufactures the best portions of the locusts into doubletrees, which find a ready market. One black locust, he told Extension Forester A. M. Sowder, made 130 salable doubletrees, besides fence posts and firewood. With a view to growing more trees of the long clear lengths that produce the most doubletrees Mr. Mallett makes it his practice to remove side limbs from young locusts growing up on his farm, either pinching them off or using a knife.

Mississippi Farmers Construct Firebreaks

The 1929 crop of longleaf pine seed in Mississippi was an unusually abundant one, and with a view to protecting the heavy reproduction expected agricultural extension workers in the State are making a special feature of firebreak demonstrations. Forty men attended such a demonstration carried out in Lincoln County by County Agent Ashford with the cooperation of six farmers. One of the farmers furnished a team and plow, one a small spray pump, and each farmer brought an ax. Four men with axes cleared the way before the plow. The plowing was done parallel with a public road, at a distance of about 20 feet. The plowed line consisted in a single furrow where undergrowth and litter were not thick, elsewhere of two furrows thrown in opposite directions. When the plowing was finished the crew burned and cleaned the space between the plowed line and the road.

Walnut Planting on Abandoned Field Gives Good Results

George M. Danhart, a farmer near Great Cacapon, Morgan County, W. Va., provides Extension Forester Thomas W. Skuce with a concrete argument for the planting of black walnuts on farms. Some years ago Mr. Danhart noticed that certain native black walnuts growing near the Great Cacapon River seemed to have an unusually thin shell and large kernel. One fall he gathered a quantity of nuts from these trees, placed them in a tin bucket, covered the bucket so as to exclude moisture, and buried them in an old post hole below frost line. The following spring he decided to put in only one more crop in a field that had been planted to corn year after year and that was located on a mountain which his rheumatism made it difficult for him to climb. He dug up his bucket of nuts, and as he planted the corn placed a walnut in each hill. The nuts sprouted quickly, and the seedlings made good growth. They began to bear when 7 or 8 years old. At the present time, for every 10 walnuts he planted Mr. Danhart has nine 12-year-old walnut trees. The trees have grown to diameters of from 2½ to 4½ inches and to heights of from 18 to 25 feet, and are giving a good yield of nuts.

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The 4-H forestry club idea has taken shape in Idaho this winter. At Winchester 26 boys and girls have undertaken first-year work in tree identification and study, and a smaller group has been organized at Cold Springs.

Mississippi School Given Demonstration Forest

Forty-eight acres of land in Wayne County, Miss., has been presented to the agricultural high school of the county by the Robinson Land & Lumber Co. for use as a demonstration forest. State Forester F. B. Merrill and D. C. Ashley, agricultural teacher of the school, have prepared a plan of operation, which will be put into practice by the students under Mr. Ashley's direction. To provide a contrast to conditions brought about by protecting the area from fire, 1 acre will be burned over annually. About 16 varieties of trees are to be planted on abandoned farm land included in the tract. Last fall the school children gathered tree seed for sowing in the school forest nursery and next winter they will transplant the seedlings in the field. Located on a main highway and representing a variety of forest types, the tract is expected to serve as a valuable demonstration to landowners of the vicinity.



The public schools of Republic, Marquette County, Mich., are reforesting a 40-acre tract of cut-over and second-growth timber land presented to them by Henry Ford.



The University of California reports registration of 13 graduate students in its division of forestry in the fall semester of 1929. The division's total registration for the semester was 70.

Boy Scout trail building in Glacier National Park will be continued in the coming summer by 60 Eagle Scouts from New Jersey, Washington, and many States between. In 1925 a band of 19 eagles left their mark on the Glacier in the shape of a trail in Two Medicine Pass, and for three successive summers work has been carried on in the St. Mary Lake region. In 1929, 45 eagles from 17 States built about 4,700 feet of trail. Men employed by the National Park Service direct the boys' work and do the necessary dynamiting.



The establishment of shelter belts on North Dakota farms was continued in the spring of 1929 with the planting of 155,000 trees under the direction of the State extension forester and the State forester. Of the 260 plantings made 160 were demonstration shelter belts and 40 were additions to shelter belts previously established.



The Argonne School District, in Forest County, Wis., has received 120 acres of cut-over land for a school forest as a gift from the Chicago & North Western Railway Co.



Motion pictures of the Okefinokee Swamp of Georgia are included in a forestry news reel prepared by W. C. McCormick for use in connection with the southern forestry educational project. The reel also records the Georgia Forest Fair of 1929.

Forest Service Notes

Douglas Fir Seedling Mortality Heavy on Plots Without Shade

Ten days was the lifetime of Douglas fir seedlings that germinated on a plot of fire-blackened soil, without shade, studied in 1929 by the Pacific Northwest Forest Experiment Station. Seedlings grown on an adjacent unshaded plot with a specially prepared yellow mineral soil surface suffered a mortality of 89 per cent during the season.

The study area was in the Wind River Valley of Washington. Seedlings germinated on the two plots in the period May 13-17. On the first hot day of the season, May 20, with an air temperature of 89° F., the surface temperature of the charcoal soil rose to 143° F. and killed 47 per cent of the seedlings, while on the yellow soil a surface temperature of 125° F. caused no

seedling loss. After two more days, with air temperatures of 85° and 89° respectively, all the seedlings on the black soil were dead. The extreme heat at the soil surface had cooked their stems. On the yellow soil the loss in the same period was 16 per cent.

During the fourth day, when the air temperature reached 83°, the loss of seedlings growing on yellow soil mounted to 32 per cent. A later loss of 10 per cent was attributed to after-effects of heat injury suffered during this 4-day period. A month without critical temperatures allowed the surviving seedlings to harden to such a degree that a soil temperature of 147° on July 30 apparently resulted in no deaths from heat injury. During the season this group sustained further losses of 5 per cent attributed to damping off, 16 per cent from insect attack, and 26 per cent from drought, leaving a survival on October 1 of 11 per cent.

An Improved Plan for Estimating Range Utilization

By R. R. HILL, United States Forest Service

Forest officers responsible for the administration of national forest range lands are working out a new method for making estimates of range utilization, through which they hope these estimates will gain greatly in uniformity, orderliness, and accuracy.

At the end of the grazing year each forest ranger whose district includes range land is called upon to report to what extent the forage on each grazing allotment under his charge has been overgrazed or undergrazed. Such reports form the basis upon which changes are made in the numbers of stock admitted to the allotments, in distribution of stock, and in methods by which the stock are handled; therefore the accuracy of the rangers' estimates is a matter of great importance. The grazing manual gives no definition of proper utilization that is sufficiently detailed to serve as a guide in the management of specific types, stating merely that as a general rule from 10 to 25 per cent of the palatable vegetation should be left at the end of the season. The determination of what constitutes 10 to 25 per cent of the palatable vegetation on a given area remains as a difficult problem for the forest ranger and the range inspector. In general, each forage type is made up of plants varying greatly in palatability. One of the main objectives of range management is to maintain the important plants of high palatability. Obviously, when the more palatable plants have been grazed as fully as they should be, a considerable quantity of the less palatable forage remains unutilized. Consequently a special definition of proper utilization must be set up for each important forage type. Further, this definition must be modified to meet local requirements in regard to protection of timber reproduction, of soil and watersheds, and of wild life and recreational resources.

After the percentage to which each important plant species should be grazed has been determined, the next problem is to define an accurate and practical way of deciding when the specified utilization has been reached. The method generally in use at present consists in an ocular estimate by the ranger, checked only by his own judgment. Experience has shown that forest officers' opinions are apt to differ widely as to what constitutes proper utilization and as to the degree of actual grazing use.

The present proposal is for the forest supervisor and range inspector to develop a formula which will indicate for each important forage type the quantity of available feed produced by each plant species in the average year and the quantity that should be left at the end of the grazing year. (Average yearly forage production is made the standard because all carrying capacity esti-

mates are based on average production.) Provision is to be made for the ranger to enter his estimates as to the average quantity of each forage species actually left at the end of the grazing year, and as to the percentage by which the current year's forage crop exceeds or falls short of the normal. By comparing actual utilization as estimated by the ranger with proper utilization as estimated by the supervisor and inspector, the degree to which the forage has been overgrazed or undergrazed can readily be determined.

Important forage species	Average height of plant or length of stem growth in average year (inches)	Average portion of plant left on range				Per cent of total forage which plant represents	Per cent of total forage left on range	
		Proper		Current year			Proper (4) x (7)	Current year (6) x (7)
		Height (inches)	Per cent of total growth of plant	Height (inches)	Per cent of total growth of plant			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aristida fescue	14	10	71	12	86	40	28	34
Mountain muhlenbergia	18	7	40	10	55	30	12	16
Senecio serra	30		20		25	5	1	1.2
Mertensia ciliata	24	2	8	4	17	5	.4	.8
Cercocarpus parvifolius	10	3	30	2	20	5	1.5	1
Total						85	43	53

Utilization—per cent under (—) or above (+) proper, —10.

Current forage crop—per cent under (—) or above (+) normal, +15.

It is believed that the use of the formula described involves no step that is not taken in connection with methods now in common use to determine carrying capacity of range lands and to judge range utilization. No forest officer, for example, would attempt to estimate the amount of forage available on the range without mentally listing the important species and roughly classifying them as to palatability. Comparisons of the current year's forage production with normal production, such as are made each year by every ranger having charge of range lands, predicate a definite mental image of the size to which the average plant of each species grows in an average year. Likewise, under present practice each ranger in making out his annual forage utilization report must have a definite conception of the average size that the ungrazed specimens of the important species attained during the current year and of the average amount of forage of each species left at the end of the year. The formula merely arranges the necessary processes in orderly fashion and provides for recording estimates in definite mathematical terms.

Is the Wet Lightning Storm a Worse Fire Starter than the Dry?

By H. T. GISBORNE, United States Forest Service

Five years' records of about 300 observation stations in the northern Rocky Mountains have been sifted by the Northern Rocky Mountain Forest Experiment Station in an effort to determine the prevalence of dry lightning storms in that region and the relative tendencies of dry and wet lightning storms to cause forest fires. The station obtained and tabulated 14,754 reports of lightning storms, of all types, that occurred in the region in the period 1924-1928, inclusive. The reports came from lookout stations well distributed throughout northern Idaho and western Montana, on both sides of the Continental Divide.

In these records a storm was classified as dry if no rainfall reached the ground under the storm cloud either simultaneously with or directly before or after the occurrence of lightning.

Of the total 14,754 reports 1,238, or 8.5 per cent, were of dry storms. By seasons the proportion of dry storms was as follows: 1924, 7.3 per cent; 1925, 7.8 per cent; 1926, 6.4 per cent; 1927, 8.8 per cent; 1928, 9.6 per cent.

The question as to whether the lightning storm caused fire was definitely answered in 8,408 of the total number of reports. Of this number 825, or 9.8 per cent, stated that the storms were dry. Of these dry storms approximately 32 per cent were reported to have started fires.

The surprise in the study of this group of the reports arose when the proportion of dry storms that caused fire was compared with the proportion of wet storms that did so. Whereas fire resulted from 32 per cent of the dry lightning storms, it resulted from no less than 34 per cent of the wet storms. In considering this finding, contradictory of so much that has been said and written about the fire-causing tendency of dry storms, attention must be given to factors in the causation of fire by lightning that are not represented in the simple classification of storms as wet or dry. The data on which this comparison is based do not distinguish heavy rainfall from rainfall so light as to be quite ineffective in preventing fires; neither do they make distinctions as to whether lightning flashes were many or few or as to whether most of the lightning flashes were confined to the clouds or struck from clouds to earth. Meteorological records show that large clouds in turbulent action generally produce more lightning than smaller, thinner, and less active clouds, that they precipitate more moisture, and that the moisture they precipitate has a greater chance of reaching the ground. Thus it may be partly because dry storms have fewer flashes reaching the ground that in the complete lookout reports covered by this study dry storms showed approximately the same fire-causing percentage as wet storms.

New National Forest Created in Florida

On January 1 the Osceola National Forest came into existence through Government purchase of 93,000 acres of land in northern Florida. The whole of this area was purchased from the Columbia Farm Lands Corporation at \$5 per acre. The new forest is located just north of Lake City. E. W. Hadley, assistant supervisor of the Ocala National Forest, Fla., has been made supervisor of the Ocala and of the Osceola and will administer both forests from headquarters in Lake City.

The Osceola Forest consists largely of longleaf and slash pine areas, which are interspersed with some cypress swamps. Most of the pine lands have a good stand of reproduction and some older trees that within a few years will be ready to be worked for turpentine. The cypress swamps contain a considerable quantity of timber; 28,000,000 feet of large cypress is already under timber sale contract. For this reason the forest will show good receipts from the beginning. On the whole, the area is an exceedingly valuable one for the demonstration of good forestry practices in the southern pine region.

Certain areas adjacent to the land already purchased are being examined with a view to enlarging the forest to 150,000 acres.

Loud Speaker Shows Promise as Fire Protection Tool

Loud speakers operated from airplanes may prove a valuable means of communicating fire warnings to forest visitors and of directing men on the forest fire line, according to the results of tests carried out last summer on the Angeles National Forest, Calif. The loud-speaker outfit used in the tests was a small one, weighing about 65 pounds. Messages spoken through it were heard to good advantage when the plane was from 900 to 1,100 feet above the auditors; at an elevation of 900 feet they had a side range of 1,000 feet. With a larger instrument, it is estimated, messages could be communicated effectively over an area about 2,000 feet in diameter from a plane at an altitude of about 1,500 or 2,000 feet. The usefulness of the loud speaker in connection with fire-suppression work would of course be limited by the danger involved in flying a plane low enough to talk to crews working near the bottoms of deep canyons.



National forest receipts during the second half of 1929 amounted to \$3,245,164, exceeding those of the same period of 1928 by \$316,053. Timber sales brought in \$2,405,829; livestock grazing fees, \$625,267; permits for special uses of land included in the forests, \$120,168; and water-power permits, \$58,042.

Farm Forestry in the Movies

How to handle farm woodlands for profit is shown in a one-reel motion picture titled "New Woods for Old," recently produced by the Forest Service and Extension Service, United States Department of Agriculture. No longer should the owner of a tract of woodland look upon it only as a source of firewood or as a hunting ground, the picture teaches; for, with right management, woodlands can be made a steady source of profit. First, it is pointed out, the owner should know what kind of timber he has and how much. To this end he should learn how to use a "cruising stick" and estimate his standing timber. Knowing what he has to sell, he should advertise for bids and sell to the highest reliable bidder, under a written contract that safeguards his interests. The contract should provide for the cutting only of the trees marked by the owner, who will have selected the mature and overmature, crooked, diseased, and spreading trees and those of poor timber value. Younger, vigorous trees of the better species will be left to form a new and more valuable stand from which additional timber crops may be harvested in the future. The contract should provide, also, for supplying the owner's lumber needs at the cost of manufacture. The picture shows Wendell, the owner of a tract of eastern hardwood in Maryland, following these simple rules with happy results for himself and his family.

Friends of Man, a four-reel motion picture recently released by the Department of Agriculture, is the latest contribution of the Forest Service to the educational campaign against woodburning. The "friends of man" are the trees that will grow as a profitable crop on otherwise idle land if given protection from fire. The picture points out in an arresting manner the undesirability of the "burning off" practice from the standpoint of good farm management. Friends of Man was filmed near Wilmington, N. C., and its story is particularly applicable to the Southeastern States. The picture is intended as a companion piece to Trees of Righteousness, filmed several years ago in Arkansas, and like it has a melodramatic tinge. It was prepared primarily for use on Forest Service motion-picture trucks operated in remote districts where motion pictures are seldom seen. Thrills are supplied by a series of spectacular shots of a real forest fire.

These films may be borrowed free of charges, other than the cost of transportation, by application to the Office of Motion Pictures, United States Department of Agriculture, Washington, D. C.



Net areas of the 150 national forests of the United States, compiled as of June 30, 1929, totaled 159,750,520 acres. The increase in the total within the year ending on that date was 269,664 acres.

National Forest Roads and Trails

In the year ending June 30, 1929, \$9,662,212 of Government funds and \$1,523,232 of cooperators' funds was expended on construction and maintenance of national forest roads and trails. The year's construction work added 2,013 miles of roads and 7,453 miles of trails to those previously in existence as part of the national-forest system. The Bureau of Public Roads built 276 miles of major roads at an expense averaging \$21,197 per mile; the Forest Service built 1,737 miles of minor roads with an average expenditure of \$1,233 per mile. Trail construction by the Forest Service was considerably less expensive than usual, costing \$139 per mile as compared with an average cost to date of \$175 per mile. The year's maintenance bills, which exceeded those of 1928, were \$529,622 for major roads, \$765,205 for minor roads, and \$415,949 for trails.

On July 1, 1929, the completed portion of the national forest road and trail system included 17,422 miles of roads and 62,275 miles of trails. It represented a total investment of \$100,798,664 for construction, improvement, and maintenance. The projected system, which according to plans approved by the Secretary of Agriculture should be completed by July 1, 1938, includes 15,332 miles of major roads, 45,799 miles of minor roads, and 131,087 miles of trails.

How Much Rainfall Reaches the Forest Floor?

Measuring spring and autumn rainfall on the forest floor at two stations in northeastern Wisconsin, foresters of the Lake States Forest Experiment Station in 1928 found that only 78.5 per cent of the total rainfall reached the ground under a stand of jack pine and that only 81.7 per cent penetrated the canopy in a forest of hardwoods and hemlock. The hardwood-hemlock forest canopy let through only 75.4 per cent of the rainfall in the spring, when the hardwoods were in leaf; in the fall, when the hardwoods had shed their leaves, the proportion rose to 84.5 per cent.



Important conifers of the Northwest are described in biweekly press releases which the Portland, Oreg., office of the Forest Service is sending out this year to high schools in its territory. Each release deals with one species, telling "what the tree looks like, how it lives, where it is found, and what it is good for." The material is suitable to be published in school papers, used in English classes, posted on bulletin boards, or placed on reference in libraries. This is the sixth year in which the Portland office has distributed a series of press stories to high schools.

General Forest News

Spruce Bud Worm Attacks Lodgepole Pine

By. R. E. BALCH, United States Bureau of Entomology

Not only does the spruce bud worm feed and prosper on many conifers other than the spruces, but it gives evidence of being able to alter its diet and even its food preferences to suit circumstances. The latest addition to the list of its victims is the lodgepole pine.

In the Northeast, where it has done its greatest damage, this insect shows a distinct preference for balsam fir. This is doubtless due to the fact that the fir affords suitable food for the caterpillars throughout their period of development. On the spruce the insects can eat only the new growth; on the fir, after consuming the new foliage they easily feed on the old. Thus in this region the greatest damage by the spruce bud worm has occurred where balsam fir was most prominent in the stand.

The earliest intensive studies of the spruce bud worm were made in eastern Canada. Although these studies showed that the insect would feed on hemlock, larch, and pine, they did not disclose the possibility of its becoming epidemic elsewhere than in stands of spruce and balsam. A few years ago, however, an epidemic appeared on pine, chiefly *Pinus banksiana*, in the Lake States. Here the insect, found to be morphologically the same species as that attacking spruce and fir in the Northeast, preferred pine to either fir or spruce. In the West the bud worm has been known for some time as a serious enemy of Douglas fir, defoliating and killing large quantities of timber of this species, but until recently had not been found to infest pine, larch, or hemlock to any marked degree except where they were surrounded by Douglas fir. In 1928, however, a considerable infestation of the spruce bud worm was discovered in a pure stand of lodgepole pine around the southwest corner of Yellowstone Park. In 1929 this infestation covered 75 square miles.

Here the preferred host is definitely lodgepole pine. Although Douglas fir and alpine fir are scattered throughout the lodgepole, frequently surrounded by pines on which all the new foliage has been destroyed, the bud worm feeds on them in small numbers only. In fact a closely allied moth, *Peronea variaria*, has done more damage to the fir and spruce in this district than has the bud worm. In Cody Canyon, not 60 miles distant, Douglas-fir timber is being killed over a large area by a race of the bud worm that consistently avoids the lodgepole pine so long as it can obtain fir.

Two distinct biological races seem to have appeared in these two closely adjacent localities, with host preferences adapted to the type of stand in which they exist. Superficially they are the same in appearance, although the insect which feeds on lodgepole is invariably smaller. (Busck has named the latter *Cacoecia fumiferana* var *lambertiana*.) While in nature these

races, or varieties, do not appear to change their food preferences readily, in the laboratory the insect has been forced to change from pine to fir in the last two larval stages and after doing so has completed its development. It may be that when obliged to accept a new host for a number of generations the insect acquires a preference for that host. If so, future outbreaks on other conifers may be anticipated.

On Douglas fir the insect readily eats the whole of the leaf, although in the earlier stages it needs young tissue. It even attacks young twigs. When feeding on pine it avoids mature tissue, even in the later stages, possibly because the epidermis is too tough or the mesophyll unpalatable. Moreover, it feeds almost exclusively at or near the base of the needles, making a hole through the bundle sheath to reach this part. This seems to be due to a preference for growing tissue. Owing to this difference the attack is much less damaging to pine than to Douglas fir; on normal pines three or more years of concentrated attack will be required to effect complete defoliation.

On the lodgepole pine area little mortality has occurred until after the third year of attack, although in many cases leaders have been killed the first year. Mortality is greatest in the dense, younger second growth.

Artificial control of the spruce bud worm is difficult. In Canada it is being attempted through the application of arsenical dust by means of airplanes. The caterpillars' habit of spinning webs of silk around the foliage upon which they feed makes poisoning difficult on fir, and still more difficult on pine since the bases of the needles are particularly hard to reach with the poison. Parasites are becoming numerous, but any expectation of control by natural means in the near future is purely speculative.

Blister Rust Control Operations of 1929 Cover 900,000 Acres in Eastern States

White pine blister rust control operations of the year 1929 covered 919,755 acres in the New England States and New York, including 131,492 acres on which initial control operations had been carried out previously. In these States 158 towns contributed \$41,323 to the year's work and 4,369 individuals contributed \$50,381. The cost per acre was 18.6 cents. Systematic control work was begun in Pennsylvania during the year, with the eradication of *Ribes* from 4,877 acres.

Michigan in 1929 made use of its first blister-rust control appropriation, protecting 2,378 acres of State forests and, with the cooperation of a town, 380 acres of other land. In Wisconsin the lack of funds limited control work to 120 acres of privately owned land.

The Boyce Thompson Southwestern Arboretum

An arboretum higher and drier than most is under development a few miles west of Superior, Ariz. It is a project of William Boyce Thompson, who founded the Boyce Thompson Institute for Plant Research at Yonkers, N. Y. About 2,000 acres of land at an elevation of approximately 2,600 feet has been set aside as the Boyce Thompson Southwestern Arboretum, with purposes which the founder has described as follows:

In another century this country must feed, clothe, and shelter several hundred million people instead of 100,000,000 as now. We are to help get ready to do this. I have in mind far more than botanical plant propagation. I hope to be able to benefit the State and the Southwest in the addition of new products. Nearly everyone outside her boundaries appears to regard Arizona as a desert land. In reality she has no true desert. * * * Her plains have as much floral life as there is anywhere on earth. Nothing can be greener than an Arizona winter, with its decking of myriads of wild flowers. To her indigenous plants, shrubs, and trees I am planning to add every plant that will grow here. There will be the creation of a plant collection that will be of interest to the nature lover and the plant student, but we are going to stress the practical side and see if we can not obtain results that will make these hillsides and canyons far more productive and of far more benefit to man than they are at present.

Plants and trees that are native to Arizona, Nevada, New Mexico, California, and Texas will be studied intensively at the arboretum and experiments will be made in introducing species that grow in arid and semiarid conditions in foreign lands, including Australia, Africa, South America, Southern Europe, the West Indies, and Mexico. Some plants are to be maintained under natural conditions so far as rainfall is concerned, to see what results can be obtained through culture and protection from natural enemies. Others will be irrigated to determine the possibilities of greater development of plants the vigor of which has been established through centuries of growth in arid conditions.

In the five years since the arboretum was established active work has been begun on a comparatively small area. In a sheltered valley close to the State highway between Phoenix and Globe buildings have been erected for laboratory and propagation work and for institution headquarters. Water is pumped to the arboretum reservoir from a well in the Queen Creek Valley. Seeds and plants brought in from many parts of the world are started under glass in the propagation rooms and transplanted thence to lath houses, where they are carefully watched and tended in preparation for planting in the field. With trees and plants that have been graduated from the propagation house an interesting canyon garden has been developed. Here trees of possible value for shade or for fruit are interspersed with plants that are expected to prove

valuable as ornamentals. Labels acquaint the visitor with the names of the species.

An important feature of the work being carried on at the arboretum is an especially elaborate study of root growth.

F. J. Crider has charge of the arboretum, with Fred Gibson as his assistant. In planning the work of the arboretum he has had the advice of William Crocker, director of the Boyce Thompson Institute for Plant Research. Cooperative relations have been formed with several institutions of learning and research, particularly with the University of Arizona and the Office of Foreign Plant Introduction of the United States Bureau of Plant Industry. The Forest Service is cooperating, through its office of range research, by furnishing the arboretum with seeds of promising native plants and plans to make field tests on the range of those plants which prove of practical value in the experiments at the arboretum.

The arboretum was formally dedicated in April, 1929.

Nucleus of Great Smoky Mountain National Park Ready for Government Administration

The States of North Carolina and Tennessee have notified the Secretary of the Interior that they are ready to turn over to the Federal Government 150,000 acres of land acquired for the purpose of establishing the Great Smoky Mountain National Park. The law providing for the creation of the Great Smoky Mountain National Park set 150,000 acres as the minimum that the Government would accept as a nucleus of the proposed park. The Government agreed to take over this area for administration and protection pending purchase and presentation by the two States of the greater part of the remaining available park land in the Great Smoky Mountain district. When the additional area, of more than 277,000 acres, is presented the Government will proceed with actual development of the park.

The two States have raised nearly \$5,000,000 to be used in purchasing land for the park, and the Laura Spellman Rockefeller Memorial has pledged a contribution not exceeding \$5,000,000.



The International Pulp Co. is reported to have succeeded in reforesting about 250 acres of land near Fullerville, St. Lawrence County, N. Y., that was formerly almost devoid of tree growth and covered with blowing sand. Northern white pine and Norway pine have been used in the planting, which began about 15 years ago. The blowing of the sand has been eliminated and the road through the area, which was formerly impassable most of the year, is now passable at all seasons.

Meeting of Society of American Foresters

Convening at Des Moines, Iowa, on December 30, for its twenty-ninth annual meeting, the Society of American Foresters devoted a day to discussion of different aspects of national forest policy and another day to technical papers and society business. Wilson Compton, manager of the National Lumber Manufacturers Association, presented the view that the consumption of forest products in this country may reasonably be expected to decline in such a degree as to eliminate danger of a timber famine. This theory was opposed by Earle H. Clapp, assistant forester, United States Forest Service, on the basis that the South and the West Coast are the only sections of this country now exporting forest products and that Eastern and Middle Western States are importing heavily. Mr. Clapp emphasized, also, the need of forests for purposes other than timber production, including recreation, flood control, erosion control, and restoration of fertility to worn-out soils, and the fact that for an enormous acreage the alternative to forest production is idleness.

Page S. Bunker, State forester of Alabama, discussing the idle-land phase of the national forest problem, expressed the feeling that this should be met through private initiative rather than through Government action. H. H. Chapman, professor of forest management in Yale University, in discussing Mr. Bunker's paper questioned many of the assumptions which he found expressed in it, such as that forest production must pay, as a separate business enterprise, on the same basis as other business ventures regardless of its function in providing raw materials for industry, that public forestry is certain to be a dangerous competitor to private forestry, and that public business is in its very nature less efficient than private business.

The desirability of extension of public forests was discussed by Henry S. Graves, dean of the Yale School of Forestry, and plans of the Federal Government for acquisition of lands for national forest purposes were outlined by L. F. Kneipp, assistant forester, United States Forest Service. Mr. Kneipp stated that to date 32 separate units within 17 States have been designated for purchase, within which it is planned, if possible, to acquire 6,100,000 acres of land in addition to what has already been acquired. Land otherwise owned or already acquired as national forests and areas already approved for purchase for national forest purposes total 5,954,131 acres. In addition, Mr. Kneipp said, it is desirable that about 23 new units be designated, in which approximately 3,300,000 acres should be acquired. Mr. Kneipp proceeded to define the land-acquisition policies of the Forest Service.

A paper contributed by W. B. Greeley, manager of the West Coast Lumbermen's Association, discussing the problem of stabilizing lumber production in that region, introduced the idea that it might be in the interest of the public as well as of the industry that the

manufacturers be authorized to act collectively for control or regulation of their production. Mr. Greeley suggested the possibility of a Federal board on natural resources authorized to approve, disapprove, or modify any plans of this sort proposed by the industry. Malcolm Sharp, professor of law in the University of Wisconsin, analyzed Mr. Greeley's suggestions and expressed some doubts as to the legality of any such collective action designed for the immediate purpose of restricting production.

The technical papers presented were Dissection of Wood Fibers by Chemical Means, by George J. Ritter, chemist, Forest Products Laboratory; Environmental Control for Game Through Modified Silviculture, by Aldo Leopold, in charge of game survey, Sporting Arms and Ammunition Institute; Some Influences of the Forest in Erosion and Water Control, by W. C. Lowdermilk, silviculturist, California Forest Experiment Station; and Some Problems in Silvicultural Research, by Willis M. Baker, associate State forester, New Jersey. Hon. L. J. Dickinson, chairman, subcommittee on agriculture, Appropriations Committee of the House of Representatives, described the attitude of this subcommittee on forestry matters.

Dean Graves reported on the progress of the society's forestry education study, through which it is hoped to arrive at some definite conclusions as to what sort of training is needed by men entering the forestry profession and as to how the schools may give such training. C. H. Guise, who is assisting Dean Graves in this project, described the investigation he is making of all the forest schools in the country. This investigation includes in each case a study of the students and their motives, the education and experience of faculty members, the school's equipment and backing, and the teaching methods in use.

It was announced that a prize of \$1,000 anonymously given to the society to be awarded for a paper dealing with the solution of the nation's forest problem had been awarded to Ward Shepard, of the United States Forest Service.

Paul G. Redington was reelected president of the society. Other officers for the current year are John D. Guthrie, vice president, and Morgan Pryse, secretary-treasurer.



Another petrified forest, the only one so far discovered with the trees lying as they fell millions of years ago, is reported by the United States Bureau of Reclamation. It was found by a road-building expedition on the lower Yellowstone reclamation project, about three miles southwest of Savage, Mont. The petrified forest covers several acres. Some of the trees are 10 feet in diameter and more than 100 feet long. They all lie with their tops pointing in the same direction, indicating that they may have been blown down by a storm.

Extremes of Temperature Fatal to Western Pine Beetle

By J. M. MILLER, United States Bureau of Entomology

Very cold weather is fine weather for the entomologist in regions infested with the western pine beetle. It has been found that low temperatures may kill appreciable proportions of the broods of this insect under field conditions. In 1924 control work on the Metolius project near Bend, Oreg., was begun soon after a cold spell in which temperatures in the vicinity of Bend reached minima of 20° to 25° below zero F. A. J. Jaenicke, who started the spotting work, soon found that to burn the bark of infested trees would be a waste of effort, because a high percentage of the broods in the outer bark were already dead. Control work was abandoned, and in the following season the infestation subsided. No explanation of the high mortality of the broods was discovered other than the severe cold.

Since 1926 the Bureau of Entomology has been carrying on a series of laboratory experiments to obtain data on the susceptibility of the western pine beetle to low temperatures. By means of special freezing apparatus infested bark has been exposed to low temperatures ranging to 20° below zero F. When larvæ overwintering on western yellow pine areas at lower elevations in the region of the Sierra Nevada Mountains were artificially subjected to low temperatures some of them died at zero F., less than 30 per cent survived a temperature of -5° F., and complete mortality resulted from a temperature of -10° F. Dormant as well as actively developing larvæ succumbed without exception to this range of temperatures. Pupæ were killed by less extreme degrees of cold; they showed high mortality between 5° and -5° F., and complete mortality at -8° F. Adults showed still less resistance; their mortality was high between 12° and 5° F., and at zero F. it was complete. Eggs (in the cambium) showed greater resistance to cold than any other stage; although some of them lost fertility between 5° and -10° F., about 10 per cent remained fertile after exposure to a temperature of -15° F.

Broods from Coeur d'Alene, Idaho, showed greater resistance to cold than those from the milder climate of the Sierra Nevada region, about 25 per cent of the larvæ surviving a temperature of -10° F. although mortality was complete at -18° F.

Under field conditions, bark temperature does not fall to a point that means death to the western pine beetle until air temperature has fallen considerably below that point. The outer bark of standing trees cools more slowly than the surrounding air. Records taken by J. C. Evenden and H. J. Rust at Coeur d'Alene, Idaho, during two short periods of subzero weather indicate that minimum bark temperatures

were 10° to 12° F. above minimum air temperatures. This difference accounts for the fact that western pine beetle infestation occurs on western yellow pine areas in regions where winter weather is severe. However, the worst epidemics seem to have developed in regions where long periods of subzero weather rarely occur.

This relation of bark temperatures to air temperatures can be made to work against the western pine beetle in the summer season. Under conditions of clear summer weather, with air temperatures ranging from 80° to 95° F., bark removed from the log and placed on the ground with the inner surface exposed to direct sunlight will reach maximum temperatures of from 110° to 130° F.; and complete mortality of the beetle is assured if bark temperatures stand at 115° or 118° F. for a period of two hours. Removing infested bark and exposing it to direct sunlight can be used as a control method to supplement the general practice of burning infested bark during the fall, winter, and spring.

Sodium Chlorate as Plant Poison Endangers More Than Plants

By W. A. DAYTON, United States Forest Service

In view of the considerable interest aroused during the past three years in sodium chlorate (NaClO_3) as a means of getting rid of objectionable weeds and poisonous plants, an interest that has been evidenced by a long succession of bulletins and other papers dealing largely or exclusively with this subject, it may be well again to emphasize the fact that this chemical is a very dangerous one. Although it is undoubtedly efficacious in destroying undesirable vegetation, in general its use for this purpose on forest and range is attended by very great danger of fire and of injury to man and beast. Its use under safeguards in such places as forest nurseries is, of course, another matter. Formerly this salt was held by some authorities to be harmless; but this theory is contradicted in a recent leaflet of the Bureau of Plant Industry entitled "Chemical Weed Killers," by M. W. Talbot, and in a recent bulletin of the Washington Agricultural Experiment Station entitled "Eradicating the Bindweed with Sodium Chlorate." In the latter publication Messrs. E. G. Schafer, O. C. Lee, and J. R. Neller state unequivocally that "sodium chlorate has a poisonous effect upon livestock if taken internally, although it is not so deadly as arsenic." The danger that the use of this chemical on the range will result in livestock poisoning is intensified by the fact that vegetation treated with it retains a salty taste which attracts the stock. In addition, the chemical is so combustible that the mere friction caused by persons or animals walking through vegetation so treated has been known to cause explosions and severe fires. All in all, so far as forest and range are concerned sodium chlorate seems to be a pretty good thing to "lay off of."

Weather Conditions a Factor in White Pine Weevil Injury

By H. J. MACALONEY, United States Bureau of Entomology

Weather conditions have a marked influence on the prevalence of white pine weevil injury, the Bureau of Entomology has found through its studies of the activities of this insect in the Northeastern States. Weather phenomena affect not only the development of the weevil from the time the egg is laid but also the resumption of spring activity by the hibernating adults; furthermore, local weather conditions during the hibernating period influence noticeably the chances of successful hibernation. When a wet autumn and an open winter, with great and sudden changes in temperature and rainfall and a subnormal quantity of snow, are followed by a backward spring, many of the hibernating beetles are killed. This is what happened in New England in 1927-28.

Weather Bureau reports for the period October, 1927-May, 1928, show that snowfall was below average until the first of March and above average from then until early April. Total precipitation for the period was above normal. Temperatures averaged above normal until the first of March and below normal from then until June. Over a period of years white pine weevil attack had been gradually increasing in the New England States, but in the spring of 1928 the increase was checked. In some sample plots a slight increase occurred; but over the region as a whole the infestation did not increase, and on some sample plots it decreased very noticeably.

The following season told another story. Weather records for the period November, 1928-May, 1929, show that November and December were warm and dry. Snowfall was less than average until January 1, but from then almost to the beginning of spring the ground was blanketed with snow. March was warm and wet. April had a little more than normal snowfall. May and June were warm, and vegetation developed

less slowly than in the previous season. In 1929 weevil attack, instead of repeating the decrease of 1928, was exceptionally heavy. Data from sample plot records indicate that there was a greater amount of weeviling in New England, and also in New York, in the season of 1929 than in any other year for which the Bureau of Entomology has records. Ordinarily the developing larvae of the weevil kill only two years' growth; in 1929 the development of unusual numbers of larvae was indicated by the fact that the number of leaders killed back three or more years was the greatest ever observed.

Naval Stores Factors Oppose Premature Tapping of Southern Pines

In efforts to discourage premature tapping of southern pines for naval stores production the United States Forest Service enjoys strong support from the Naval Stores Factors Association. Forest Service experiments have shown that if a tree is to produce the maximum lifetime yield of resin it should not be tapped until it has attained a breast-height diameter of 9 inches. Members of the factors' association are advising their customers to observe this minimum, and are punctuating their advice by giving away 5-ply veneer tree gages having a 9-inch opening. About 1,000 of the gages have been distributed. Moreover, naval stores factors of Florida have discarded their old lease form and adopted one incorporating the requirement that no trees less than 9 inches in diameter at breast height be tapped.



T. B. Mathewson, superintendent of Goddard Memorial Park, Warwick, R. I., reports success in establishing a protective growth of pines on wind-swept sand dunes at the park. After much difficulty in saving his newly-planted pine seedlings from being buried alive by the sand, Mr. Mathewson found that a 2 to 3-foot stake driven into the ground on the windward side of each seedling breaks the wind and checks the drift of the sand sufficiently to allow the little tree to get a start.

Foreign Notes

Mexican Forestry Congress

The Mexican Forestry Society (Sociedad Forestal Mexicana), in cooperation with the Forest Service of Mexico, has arranged for a national forestry congress at Mexico City February 14-22, 1930. Owners of forest land, persons interested in the exploitation and manufacture of forest products, foresters, farmers, stockmen, representatives of municipalities, and all others interested have been invited to attend. The purpose of

the conference is to discuss the forestry situation in Mexico and to crystallize ideas regarding desirable forest policies, as a preliminary to the Inter-American Conference on Agriculture, Forestry, and Animal Industry to be held at Washington later in the year. Topics on the program include: National forests, State forests, national parks, communal and municipal forests, private forests, protection of forests and ranges against fire, protection against insects, forestry education, reforestation and correction of torrents, forest statistics, economic and fiscal problems, and forest legislation.

How Seed Selection Forced its Way into European Forestry

By E. N. MUNNS, United States Forest Service

During the eighteenth century the question of ship timbers was a live one among the maritime powers of the day. Most of the European powers, having no great amount of first-quality pine timber of their own close to the sea, went to the Baltic for special sticks obtainable there. The transportation of such commodities was a risky thing, however, especially in times of international friction, and had the additional handicap of the tribute exacted by the Danish kings. This demand of tribute apparently irked France especially, for we find that she imported Baltic seed and attempted to grow pines of northern quality on her own soil. This seems to have been the first European attempt to use selected seed for reforestation purposes. Later England gave special consideration to the question of supplies of desirable oak, but it is questionable that the English ever practiced extensively the planting of acorns from trees selected as having the desired form.

Late in the eighteenth century Darmstadt, in Hesse, became a forest tree seed center. Aside from the fact that the climate permitted air drying of the cones, just why this happened does not appear to be known. Russia and Sweden were among the early foreign buyers. With them seed collection was impossible because the northern climate was too cold and damp for natural seed drying.

Early in the nineteenth century Swedish foresters found that they were getting unsatisfactory results with the German seed. While the early growth was good, it was often caught by either late spring or early fall frosts. Besides, the later growth rate was below that of the natural stands, and the stems were not so straight as those of the native product. Indeed, some pine plantations failed at from 30 to 50 years of age, causing considerable anxiety as to the development of the planting program. It appears that spruce, also, became diseased and died at early ages.

Confronted with these conditions, the Swedish Forest Service stopped all planting of stock from foreign spruce and pine seed on the State forests and issued warnings to private owners as to the losses likely to result from such planting. Then, in order to overcome the lack of natural facilities for drying cones, the Swedes developed seed-drying kilns. Still, seed was expensive and was difficult to obtain in the quantities desired. Consequently pine seed from southern Germany and spruce seed from the Hartz Mountains continued to enter Sweden. To reduce importations Sweden placed a duty of about 6.5 cents per pound on the seed. This duty has been increased from time to time. As an aid to the local dealers the Government requires that all imported seed be stained, and sold as foreign seed.

In Germany the results of using cheap tree seed manifested themselves less promptly, because the climate was warmer and the season longer than in Sweden. The need for cheap nursery stock had led the German seed collectors to the dune region of France and Belgium, where seed was borne nearly every year on low, crooked trees from which it could readily be gathered. In time the Germans in the great inland plain realized that they too were incurring troubles by using poor seed. These troubles were the more marked because of the fact that Germany was developing a clear-cut-and-plant silviculture. In 1910 the Union of German Seed Dealers was organized with the policy of collecting good seed and guaranteeing it as such. Since then there has been created the Prussian Seed Control Station, at Eberswalde, supported at least in part by the State. Now a Prussian forester, before he may sell seed, must have had his stand examined by an official committee and received from the committee a bill of health as to the quality of his forest. The rating of a forest by this seed committee is a formidable affair; not only is the Prussian State Government represented but also the association of forest land owners, the Prussian society of professional foresters, and the seed dealers. The forest is examined not alone as to its health and growth rate, but with respect to every other factor that might influence the quality of the seed. Samples of the seed are sent to the seed control station for testing as to purity and germination.

Seed from native pine forests of the best quality now commands in Germany a price premium of from 30 to 100 per cent over the French and Belgian seed. So valuable is the certified seed crop from selected trees that foresters wishing to sell seed have worked to develop large groups of trees of uniform size, in which they allow no poorly formed tree to remain. Any tree that appears not to be a seed producer is removed at the first opportunity, because such trees reduce the possibility of the forest receiving a high rating that may enable it to bring in some very welcome intermediate revenues.

Southeastern Ontario Conditions Permit Successful Field Planting of Tree Seedlings

Early results in a planting experiment under way at the Petawawa Forest Experiment Station, in southeastern Ontario, give evidence that the climatic and soil conditions existing in that locality make it possible to transfer planting stock from the seed bed directly to the field with results no less satisfactory than those obtained when the stock is given an intermediate period in transplant beds. In this experiment white spruce has been used as a representative pulpwood species and Norway pine as a representative lumber species.

One of the plots on which the experimental plantings were made is situated on a damp, low-lying area; the

other is on dry, sandy loam in an open abandoned field having a slight easterly slope. On the first plot 12 subplots, each 100 feet square, were planted to spruce; on the second, 6 subplots of this size were planted to spruce and 12 to Norway pine.

All plantings of each species were made with trees from the same lot of seed sown in the same nursery in the same year. Plantings made in the spring of 1924 were 2-year seedlings direct from the seed beds, and those made in 1925 were of 3-year seedlings direct from the seed beds; the plantings of 1926 were of trees that had spent 2 years in the seed beds and 2 in transplant beds.

During the rainy years 1927 and 1928 a considerable quantity of water lay on the first plot, particularly in the furrows. The ground cover on this plot consists of sod and tall grass, with patches of raspberry and blackberry bushes. It can reasonably be stated, says R. H. Candy, who reports the experiment in the Forestry Chronicle, that the young plants on this plot have had to compete with a considerable number of difficulties. The mortality on this plot has been about 25 per cent; its distribution leaves no reason for believing that any one class of plant has suffered more than another.

On the plot established on dry, sandy loam in an open field, the trees are subject to great competition from sod, tall grasses, and raspberry and blackberry bushes. During part of the summer many of the young trees are completely hidden from sight by the mass of competing vegetation. Mortality, however, has been negligible, amounting to not more than 5 per cent; it has been distributed fairly evenly over all the subplots.

During September, 1928, 50 trees on each subplot were mechanically selected and measured for height. It was found that for the wet site every subplot of trees that had been planted in the field as 2-0 and 3-0 stock showed an average height greater than that on any subplot of trees that had been planted as 2-2 transplants. The weighted average height of the 3-0 group was 21 per cent greater, and that of the 2-0 group was 43 per cent greater, than that of the 2-2 group. For spruce on the second plot the trend of the comparison was the same with the exception that one subplot planted with 3-0 seedlings had an average height slightly less than that of one subplot planted with 2-2 transplants; the weighted average height was 23 per cent greater for the 3-0 group and 66 per cent greater for the 2-0 group than for the transplant group.

Examination of the Norway pine subplots gave similar results, average height on each subplot planted to 2-0 or 3-0 seedlings being greater than that on any subplot planted to transplants. The weighted average heights for the 3-0 group and the 2-0 group were 15 per cent and 31 per cent, respectively, greater than those of the transplant group.

A report from the Lake Audy Nursery Station, Riding Mountain National Forest, Manitoba, quoted by Mr. Candy, states the conclusion that at that locality the cost of producing 3-0 seedlings is only one-fifth the cost of producing 2-2 transplants and, according to results from plantations established to date, mortality is not 2 per cent higher in 3-0 stock than in 2-2 stock.

Soldering Lamp for First Weeding of Nursery Beds

The weeds that come up just ahead of tree seedlings in forest nursery seed beds have been successfully destroyed by means of a soldering lamp, reports R. Misson in the *Bulletin de la Société Centrale Forestière de Belgique*. A layer of peat about 1½ to 2 centimeters thick is spread on the seed bed and is watered well, then the heat of the lamp is applied. The destruction of this first crop of weeds permits the seedlings to come up in an absolutely clean bed and postpones the necessity of hand weeding until the trees are large enough to withstand it.



A jack pine sawfly infestation covering about 30,000 acres was discovered in June, 1929, in the Kipawa Lake Region of Canada, according to a report of Thomas D. Pickard, a member of the forestry staff of the Canada Power and Paper Corporation. The infested area lies about 200 miles north of Ottawa. Evidently the sawfly has been working in the region for several years, although it seems not to have done such great damage in any preceding year as in 1929. The infestation seems to be moving eastward, and threatens the immense tracts of nearly pure jack pine which lie near the headwaters of the St. Maurice River, 150 miles east of Kipawa Lake.



A new national park has been established by the Canadian Government in the Georgian Bay region of Ontario. The park consists of 28 islands. Included among these is the 2,712-acre Beausoleil Island, which in addition to its attractions as a recreation area has historic interest as having figured in the triple battle of St. Louis, fought in 1649.



The German Government's order of February, 1929, prohibiting importation of seed or cones of pine and fir, has been modified to permit the Minister of Agriculture to allow exceptions. This order was issued because of poor results obtained from planting imported seed without determining whether climatic conditions of the site where the seed originated were similar to those of the planting site.

Sand-Dune Planting on the Island of Cyprus

In 27 years' time tree planting operations on the sand dunes of Cyprus have extended over 1,700 acres. Apparently the dune sands of Cyprus, unlike those found in many lands, contain sufficient quantities of mineral salts to permit good tree growth. Artificial watering is necessary until the young trees establish themselves. The principal species used in the planting are wattles, *Acacia cyanophylla* and *A. longifolia*. The former, which seems to be much more drought resistant than the latter, is an excellent nurse tree for *Pinus halepensis* and *P. pinea*. These pines are now

being planted in rows alternating with rows of wattles. The black locust is proving satisfactory but is not so drought resistant as the wattles. For windbreak purposes the shrublike *Dodonea viscosa* is proving valuable.



On the 6,000,000 acres of Poland's national forests less than 3,500 acres was burned over in each of the years 1923, 1924, 1926, and 1927. In only two years of the 7-year period 1921-1928 was the total as high as 8,500 acres. Because of drought conditions prevailing in 1929 it was expected that the area burned over during the year would exceed the previous high total of the decade, the 37,700 acres reported for 1920.

Personals

Paul D. Kelleter, recently director of extension, New York State College of Forestry, after a short period of service as administrative assistant to the Federal Farm Board has accepted appointment as conservation director of Wisconsin. The duties of Mr. Kelleter's new position include the administration, under the State conservation commission, of State forests and State parks and of fish, game, and other outdoor resources.

C. M. Granger has been promoted from the position of district forester, North Pacific National Forest District, to that of head forest economist in charge of the nation-wide forest survey that is being launched by the United States Forest Service. Mr. Granger, a graduate of the Michigan Agricultural College, has held a series of administrative positions in the Forest Service, which he joined in 1907. During the World War he served with the Tenth Engineers, attaining the rank of major. He has served as district forester since 1925. The project he is now undertaking, which was authorized by the McSweeney-McNary Act and for which Congress has provided an initial appropriation of \$40,000 for the current fiscal year, is a comprehensive survey of present and prospective forest resources of the United States and of the Nation's present and prospective requirements of forest products. Initial work on the survey is being begun in the Pacific Northwest. Mr. Granger's temporary headquarters are at Portland, Ore. C. J. Buck, assistant district forester in charge of lands in the North Pacific National Forest District, succeeds Mr. Granger as district forester. Mr. Buck joined the Forest Service in 1905, after receiving the bachelor's and master's degrees from Williams College and the Yale School of Forestry, respectively, and has held the position which he now leaves since 1910.

Horace J. Andrews has been appointed senior forest economist, United States Forest Service, and placed in charge of work on the forest survey project in the Pacific Northwest. Mr. Andrews leaves the position of chief fire warden, Michigan Department of Conservation. He is a graduate of the University of Michigan with the M. S. F. degree, and has served as a forestry

instructor in the New York State College of Forestry, the University of Michigan, and the Iowa State College. He is credited with an important part in the development of the Michigan land economic survey. In his new position Mr. Andrews is stationed at the Northwestern Forest Experiment Station, Portland, Ore.

Robert W. Cowlin, who specialized in economics in the forestry department of the University of California and has had several years' experience in connection with lumber operations, has been appointed associate forest economist in the United States Forest Service and assigned to work on the nation-wide forest survey, with headquarters at Portland, Ore.

D. N. Matthews has been promoted from the position of assistant supervisor of the Umpqua National Forest, Ore., to one on the forest survey staff at Portland, Ore. Mr. Matthew's particular assignment will be in connection with the collecting and compiling of national forest statistics.

Howard R. Sayre succeeds Horace J. Andrews as chief fire warden of Michigan, after assisting him for three years. Mr. Sayre is a graduate of the Michigan State College and has been connected with the Michigan Department of Conservation since 1923.

Victor H. Sonderegger has been appointed State forester of Louisiana. Mr. Sonderegger, who is a graduate of the Biltmore Forest School, has previously held that office, and has engaged for a number of years in private forestry work in the South.

D. F. McGowan, principal attorney of the United States Forest Service, has been transferred to the Department of Justice as special assistant to the Attorney General. Mr. McGowan has been selected to present to the proper courts the Government's case relating to the Northern Pacific Railway land grants. He will be assisted by E. E. Danley, who made a study of the Northern Pacific land grants case for the Department of Justice when the case was being investigated by Congress. This transfer, which is the outgrowth of Mr. McGowan's successful handling of this case for the Department of Agriculture, comes at the end of his twenty-first year in the Forest Service.

Thomas D. Burleigh has resigned as head of the division of forestry, Georgia State College of Agriculture, to accept a position as associate biologist with the Bureau of Biological Survey. He has been assigned to the Appalachian Forest Experiment Station, Asheville, N. C., where he will carry on research work in forest biology authorized by the McSweeney-McNary Act. Mr. Burleigh is a forestry graduate of the Pennsylvania State College, and received the M. S. degree in forest zoology from the University of Washington. His teaching experience in the Georgia college has covered a period of nine years. DuPre Barrett, who has been connected with the Georgia State College for about five years as extension forester, has been appointed acting head of the division of forestry. Mr. Barrett is a graduate of the Georgia State College and taught in it for some years prior to his appointment as extension forester. K. S. Trowbridge, a forestry graduate of the University of Washington who has recently been teaching forestry at the Georgia State College, succeeds Mr. Barrett as extension forester.

Oliver L. Austin, jr., has been appointed assistant biologist, Bureau of Biological Survey, and assigned to the Lake States Forest Experiment Station. Mr. Austin received the B. S. degree from Wesleyan University and has done three years' graduate work at Harvard University.

Walter E. Bond has resigned as assistant to the State forester of Texas to join the United States Forest Service as forest economist. He has been assigned to the staff of the Southern Forest Experiment Station and will assist E. A. Ziegler in a study of the financial aspects of private forestry practice.

P. L. Buttrick, who recently retired as forester of the Connecticut Forest and Park Association, will sail early in March for Europe, where he expects to spend the next two years. He will make a comprehensive study of the cork oak forests of Spain, France, Portugal, and North Africa. Mr. Buttrick continues in office as secretary of the Connecticut association.

Hugh M. Curran, formerly of the North Carolina Department of Agriculture, is now teaching forest management in the University of the Philippines. Mr. Curran was previously connected with the Philippine Bureau of Forestry, and has had experience in tropical exploration work in South America and in the West Indies.

Floyd V. Horton, supervisor of the Columbia National Forest, Wash., has been transferred to the United States Forest Service headquarters in Portland, Oreg., where he succeeds the late Douglas C. Ingram as inspector in the office of range management. Mr. Horton, who received forestry and range management training at the Iowa State College, entered the United States Forest Service in 1913 and has served on five national forests. The new supervisor of the Columbia Forest is John R. Bruckart, formerly assistant supervisor of the Olympic National Forest, Wash.

R. N. Cunningham, who has heretofore represented the United States Forest Service in work carried on under the Clarke-McNary law in cooperation with the States of Montana and Idaho, has been transferred to the Lake States Forest Experiment Station for work in connection with the nation-wide forest survey.

Oscar T. Quimby, who has been conducting experiments on the electroendosmosis of wood at the Forest Products Laboratory, Madison, Wis., recently resigned to accept a position in the research division of the Proctor & Gamble Co., Cincinnati, Ohio.

James L. Averell has been transferred from the Lake States Forest Experiment Station to the Southern Forest Experiment Station, where he will participate in research in naval stores production. He takes the place of N. T. Mirov, who recently resigned to join a turpentine and paint organization on the Pacific coast.

E. I. Terry, formerly forest manager of the Berry Schools, Mount Berry, Ga., is now assistant State forester of South Carolina.

J. Oscar Blew, jr., has been appointed an instructor in the department of timber preservation, New York State College of Forestry. He succeeds George P. Kramer, who recently resigned to enter the employ of K. M. Mitchell, industrial engineer.

LeRoy C. Stegman has been appointed instructor in the department of zoology, New York State College of Forestry. Mr. Stegman received the B. S. degree from the Michigan State College in 1928 and the M. S. degree from the University of Michigan in 1929. He was an assistant instructor in zoology in both institutions.

T. H. Harris, a member of the 1927 forestry class of the University of California, is a research assistant at the University of Idaho this year, specializing in forest pathology. This assistantship was established on the basis of a gift from the Potlatch Lumber Co.

Officers elected by the Texas Forestry Association in November for the ensuing year are: President, O. M. Stone, Jasper; president emeritus, W. Goodrich Jones, Waco; vice presidents, L. D. Gilbert, Texarkana, H. S. Filson, Houston, and Mrs. Ben Boydstun, Waco; secretary-treasurer, E. O. Siecke, College Station.

J. R. Rapp has been transferred from the New York field office of the National Lumber Manufacturers' Association to take charge of the association's Pittsburgh office, 802 Law and Finance Building. He succeeds Harold S. Crosby, who has been transferred to Kansas City. Mr. Rapp is an alumnus of the Pennsylvania State College of Forestry.

William H. Badeaux has resigned as secretary of the Northwestern Lumbermen's Association, Minneapolis, after eight years' service in that office. He is now affiliated with the Chicago Mill and Lumber Corporation of Chicago as divisional sales manager in charge of insulation sales, with offices in Minneapolis.

Willis M. Baker has resigned as associate State forester of New Jersey to join the staff of the Pennsylvania State Forest School. He will direct the Pennsylvania Forest Research Institute at Mont Alto, Franklin County. Mr. Baker is a forestry graduate of the Pennsylvania State College. He had several years' experience on the national forests in Arizona before going to New Jersey in 1917 as assistant State forester. During his service as associate State forester, dating from 1922, he has devoted much time to forest research.

William E. Branch has been appointed superintendent of Platt National Park, Okla. Mr. Branch entered the

National Park Service in 1922 as a ranger on the Mesa Verde National Park, Colo., and has since served with the Indian Service in Oklahoma.

D. Priscilla Edgerton, for three years State supervisor of forestry education in Mississippi, has resigned to accept a position on the editorial staff of the United States Forest Service. Mrs. Edgerton was previously connected with the Forest Service for an extended period and was for several years an assistant editor in the Office of Information, United States Department of Agriculture.

Bibliography

The Prairies of Madagascar

By E. N. MUNNS, United States Forest Service

Conditions interestingly similar to those found in parts of the United States are described in a study¹ by Perrier de la Bathie of the prairies of Madagascar. Prairies make up 70 per cent of the area of this island. M. Bathie found that the Madagascar prairies are not in a stable condition but exemplify retrogressive series of changes. The various stages in the retrogression apparently depend upon ecological factors and the constitution of the soil. The final stage is the *Aristida* prairie, the characters of which are the same in all parts of the island.

Except in the southwest portion, the soils of the island are mostly lateritic clays. Under a forest cover the clays remain soft and permeable. When deprived of the protective vegetation the rich humus layer, which is very thin, soon disappears under the action of fire, sun, and erosion, and the outcropping clays then become hard and impermeable. In this condition the laterite appears to be just about as fertile as bare rock. It is interesting to note that the character of the vegetation bears a direct relation to the thickness of the humus covering; when the latter is intact the soil is capable of supporting a forest from 65 to 95 feet in height; but when it has disappeared, the hardened soil supports only a thin covering of xerophytic grasses.

In the southwestern areas, because of the extreme dryness, the successions of vegetation do not occur. In the eastern zone every stage in the series of succession is found. This zone in primitive times was covered by two forest belts, the littoral and the eastern forest. The littoral forest has met with destructive treatment through abusive exploitation and through burning. The sandy substratum of this forest belt when denuded and exposed to the sun and to tropical rains soon becomes sterile, and the forest is immedi-

ately replaced by a meager vegetation, the final stage of the retrogression, without any intermediate phase. The eastern forest, largely destroyed by the natives for the sake of growing rice, now covers no more than about 3,000,000 hectares. Elsewhere it has been replaced, after burning, by scrub growth from 9 to 12 feet in height, and finally by prairie.

American Forestry Literature Poorly Represented in European Libraries

In visiting a number of forestry libraries in Europe during the past summer and fall E. N. Munns, of the United States Forest Service, found them very scantily supplied with American forestry literature. The libraries visited were found to be receiving very few, if any, of the bulletins and reports of the American forest schools and State forestry organizations except the more formal book publications. Mr. Munns believes that many of these foreign institutions and organizations would be glad to make arrangements with American institutions and organizations for an exchange of publications.

A list of important foreign forestry libraries can be obtained from the United States Forest Service, Washington, D. C.

A Circular for Extension Foresters

A mimeographed circular entitled "The Extension Forester" is now being issued by the United States Department of Agriculture. The first number, issued in October, presented material selected from the 1928 annual reports of the extension foresters of 26 States. Special attention was given to definite achievements in developing programs and in increasing the scope of activity, and to new and improved methods that appeared to merit general application. William K. Williams, extension forester of the Office of Cooperative Extension Work, plans to get out this circular at 3-month intervals.

¹ Perrier de la Bathie: Les Prairies de Madagascar. *Revue de Botanique Appliquée et d'Agriculture Coloniale*, No. 84-86, pp. 549-557, 696-707. Paris, Aug.-Oct., 1928.

How Birds and Forests Affect Each Other

In a bulletin entitled "The Summer Birds of the Northern Adirondack Mountains,"¹ Aretas A. Saunders, field ornithologist of the Roosevelt Wild Life Forest Experiment Station, has included a general discussion of the interrelations of birds and forests. On the basis of evidence accumulated by a number of students of bird life Mr. Saunders affirms very emphatically that birds consume enormous quantities of insects at the season when this results in the most economic good to man. The body temperature of all species of birds, he says, is above 100° F. and that of the smaller insectivorous birds of the forest is often as high as 108° F. The rapid heart action and rapid breathing, circulation, and digestion of food that accompany these high temperatures mean food requirements proportionally much larger than those of man and most other mammals. This is true not only of adult birds but of the young, which grow very rapidly. All the smaller song birds of which the food habits during the nesting period are known feed their young on insects. Even seed eaters use insects largely, if not entirely, when feeding their young in the nest. Nestlings of certain species are known to have gained six or seven times their weight within two weeks after hatching. In the months of May and June, which in general constitute the nesting season of birds, the annual life cycle of most insects is at its beginning. Therefore, when the nestling gorges on insects the production of many insect descendants is forestalled.

This author questions the theory that fungi and insect parasites are more effective than birds in keeping harmful insects in check. "Each individual parasite is brought into the world at the expense of not more than one individual of the insect host, whereas each individual insectivorous bird eats large numbers, often hundreds, of insects every day of its life. * * * The number of species of parasites known definitely to attack but a single host is small. * * * Hairy caterpillars, which are not eaten by most species of birds, seem to have the largest number of species of parasites. Yet they are frequently the most abundant and most destructive species, particularly to foliage of trees. * * * Insects are most abundant and occur most commonly in uncontrollable numbers, not in natural forests but on city shade trees and in agricultural areas where natural conditions have been destroyed so that birds can not live there in normal numbers. Destruction of natural cover decreases bird life but has no appreciable effect on the abundance of parasites,

yet in such cases parasites seem unable to hold their insect hosts in check."

Birds that eat tree seed, Mr. Saunders believes, in general pay their way by scattering and distributing seed. Birds of prey perform a valuable service in holding small rodents in check. The sapsucker, he is inclined to think, largely confines its attacks to the less valuable tree species and does less injury than has generally been supposed.

Turning to the influence of forests on birds, Mr. Saunders condemns strongly the tendency to clear forests and roadsides of underbrush in the belief that "bushes are somehow untidy," thus making them uninhabitable for birds; also the indiscriminate removal from the forests of dead trees and stubs, desired as homes by the woodpeckers, on the theory that they harbor fungi and insects of harmful possibilities. "I do not know of a single species of insect or fungus," he asserts, "that starts in a dead tree and spreads from there to live ones." Efforts to increase the number of birds on a given area are best expended in restoring natural conditions rather than by artificial feeding; and the possibility of attracting to an area by artificial feeding larger numbers of birds than are attracted to it by natural forest conditions is limited by the fact that each nesting pair of birds instinctively refuses to permit others to nest within a certain distance.

An East African Estimate of Forest Influences on Climate and Water Supply

By E. N. MUNNS, United States Forest Service

During the past quarter century there seems to have been a marked let-down in the interest felt by American foresters in forest influences as contrasted with forest products. In the early days of forestry in the United States the former aspect of the subject had as strong a hold on the interest of the profession as the latter; in fact, forestry in America was founded principally on the belief that forests play a vital part in the regulation of stream flow, in the amelioration of climate, and in the prevention of erosion. Nowadays these considerations seem to be greatly overshadowed, in the interest of the average American forester, by the potentialities of the forest as a source of lumber for our houses, pulp for our newspapers, and cellulose for our stockings. It is therefore doubly interesting to come upon such a lively argument in support of the earlier faith as that which J. W. Nicholson, forest adviser to the Governments of Kenya and Uganda, East Africa, presents in a bulletin recently published by the forest department of the former colony.

¹ Roosevelt Wild Life Bulletin, vol. 5, no. 3. 496 pp. illus. Syracuse, N. Y., 1929.

Mr. Nicholson states that the physico-geographic features of Kenya, Uganda, and neighboring countries are such as to render it extremely improbable that ocean vapor can adequately penetrate into all parts of the Provinces, and that from the point of view of the residents of Kenya the most important influences of forests are those which concern rainfall and water supply. At least in parts of the two Provinces, he believes, changes in the vegetative covering are apt to have not only an appreciable but an enormous effect on the total rainfall, trees and deep-rooted shrubs contributing more moisture to the air than herbaceous vegetation or bare soil. On the basis of European studies and of research carried out by Phillips at the South African Forest Experiment Station he concludes that under favorable circumstances mountain forests can induce "occult precipitation" (moisture condensed from fog or dew) amounting to as much as 25 per cent of the total annual rainfall. He believes that in the case of such rainfall as accompanies monsoons the local effect of forests is limited to a maximum of about 3 per cent of the precipitation, although the regional effect may be far greater. Where meteorological conditions in East Africa are favorable to the production of "instability rain" (rain accompanying the convectional type of storm), he is convinced, the presence of forests greatly increases the quantity of such rain. He quotes a series of personal observations in India and Uganda in support of this theory regarding instability rain, which in East Africa occurs frequently on still afternoons, usually after bright sunny mornings, and is always narrowly local in its distribution.

In considering the relationship of forests and stream-flow the author expresses the belief that in hilly countries forests are ordinarily conservers of stream flow, and that the steeper the slope and the heavier the precipitation the greater is this influence. By preventing erosion and checking surface run-off, forests increase the underground seepage and so tend to maintain a steady flow of water in streams. Other theories stated include the following: The moisture capacity of deep, porous soils not liable to erosion is less subject to improvement by forest cover than that of shallow non-permeable soils and soils liable to erosion. The greater the porosity of the underlying rock the less likely is a forest cover to exercise a beneficial effect on stream flow. Where rainfall is normally continuous and light there is less need for the soil to possess a large moisture capacity than where rainfall is heavy and irregular. In the latter case forests have a greater influence on run-off; they can mitigate the severity of floods induced by heavy rain, although they apparently can not prevent such floods. In general, on wet soils the local flora tends to reduce the amount of moisture it contains, whereas on dry soils it tends to

increase such moisture. It is otherwise with fast-growing exotics such as gums or wattles in South Africa, which have been shown by research to exert a great desiccating influence on the soil.

Proceeding to the subject of forests and wind, Mr. Nicholson strongly advocates the development of windbreaks to protect agricultural areas in Kenya from desiccating northeast winds.

Farmers in Kenya, this author reveals, are not unaware of the importance of the influence of forests on water supply and climate; in recent years various farmers' associations have passed resolutions urging the local government to adopt a bold policy of forest conservation and afforestation.

(Nicholson, J. W.: *The Influence of Forests on Climate and Water Supply in Kenya*. pp. 40. Colony and Protectorate of Kenya Forest Department Pamphlet No. 2. The East African Standard, Ltd., Nairobi, 1929.)

Timber Growing and Cutting Practice in the Lodgepole Pine Region

In the bulletin entitled "Timber Growing and Cutting Practice in the Lodgepole Pine Region," the United States Forest Service has published a discussion of silvicultural and timber-marketing problems that are primarily its own. The timberland of the lodgepole pine region comprises about 23,000,000 acres of mountain and higher foothill land in Montana, Wyoming, Colorado, Utah, Nevada, and southeastern Idaho; of this acreage, exclusive of that included in the Yellowstone, Glacier, and Rocky Mountain National Parks, about 87 per cent is in national forests. Approximately 5 per cent is in the public domain or within Indian reservations, 1 per cent in State ownership, and 7 per cent privately owned.

In general the timber of this mountainous region grows slowly, largely because of high altitude and also, on many areas, because of rocky site, shallow soil, or a crowded condition of the stand; the timber is relatively low in quality, and in many localities the rugged topography makes logging operations expensive. Nevertheless the forests of the lodgepole pine region serve a very important purpose immediately affecting the lives of people in the States named and in neighboring States; they regulate and conserve water supplies that even if perfectly conserved would be insufficient to irrigate all the arid lands which in order to become productive would have to be irrigated from this source.

Railroad ties are the principal forest product marketed in the lodgepole pine region. Others are mine props and mine timbers, telephone poles, and lumber. For silvicultural reasons an additional market for small-sized material such as might be utilized for fence posts or paper pulp is greatly needed.

The most important forest type of the region, from the standpoint of volume and of present demand, is that in which the predominant species is lodgepole pine. Large continuous stands of lodgepole are an outstanding characteristic of its timberlands. This species typically occurs in dense, even-aged stands, many of which are seriously crowded and stagnant. By far the most important type in the region for watershed protection is that containing 50 per cent or more of Engelmann spruce. In the third outstanding type the characteristic species is Douglas fir.

Lodgepole pine begins to bear seed at an age of about 15 years and produces at least a fair crop of seed each year. Some of the cones remain unopened on the trees for years, and thick cone scales protect the seed from fire injury. For these reasons lodgepole pine forests reproduce plentifully even after clear cutting or burning, unless a second burn occurs before the trees reach cone-bearing size. Engelmann spruce and Douglas fir are later in beginning to bear seed, and produce good crops of seed less regularly. However, since these species typically occur in uneven-aged stands, advance growth is usually present at the time of cutting; and trees less than 10 inches in diameter are usually left as unmarketable. In general the Engelmann spruce and Douglas fir types restock amply after cutting if the cutting is not followed by fires, and, in the case of the latter type, if the cover and slope give protection from direct sunlight. Thus the requirements for keeping forest lands in the region productive largely narrow down to a matter of fire protection and slash disposal.

Features of the cutting practice suggested for the region by M. W. Thompson, author of this bulletin, are that trees should be cut as nearly as possible at the time when mean annual growth begins to decline; that light cuts should be made, at relatively short intervals; that danger of damage from windthrow should be carefully considered; and that young growth should be protected from logging damage.

In the lodgepole pine type, where stands are dense at all ages and high winds recur frequently, fires are usually intense. The thin bark of the lodgepole, also, affords little protection. In the Douglas fir type the situation is much the same, except that the Douglas fir is protected by a thicker bark. In the Engelmann spruce type fires are more rare but protection is even more important, because an extensive severe burn usually precludes restocking. In general, the risk in this type is less, because sites are more moist and elevations higher. An important element in the fire situation is the fact that neither power logging nor logging railroads are used. Locomotive-caused fires have been largely eliminated. At present campers and smokers and lightning are responsible for nearly all

fires. Mr. Thompson describes the fire-protection system maintained in the region by the Forest Service, and protection measures recommended by the service to railroads, lumber operators, and forest visitors.

In the lodgepole pine and Douglas fir types the Forest Service has found it desirable where fire danger is serious to lop the limbs from the tops of felled trees and leave the slash on the ground, except in places of special fire hazard such as around sawmills and camps and along main roads, where it is best to pile and burn the slash. This plan means piling and burning slash on about 5 to 10 per cent of the cutting areas. In localities of high risk, slash is piled and burned on strips 100 feet wide so as to leave no continuous area of slash exceeding 160 acres. In the lodgepole pine type broadcast burning of slash results in too dense reproduction, and burning the slash in piles results in damage to standing trees. The slash left on the ground disintegrates fairly rapidly, helps to build up the productivity of the soil, and in many places aids materially in preventing erosion. This practice has been followed on national forest areas in the region since 1922 with no increase in the acreage burned annually. In the Engelmann spruce type, because the spruce has more and larger limbs and utilization is generally less complete, more slash is usually left after logging. However, whereas the needles of lodgepole pine may persist for two years or longer those of the spruce drop off during the first year after cutting. Accordingly, throughout the greater portion of the region the practice on the national forests is to lop spruce slash and leave it on the ground.

Copies of this bulletin may be obtained, while the supply lasts, from the Office of Information, United States Department of Agriculture, Washington, D. C.

Leaflet Describes Yellow Poplar and Its Propagation

Characteristics of yellow poplar that make it rank high, perhaps first, among hardwoods in its range as a species desirable for propagation, are described in a popular leaflet prepared by E. F. McCarthy, director of the Central States Forest Experiment Station. A table gives average growth and yield per acre in well-stocked stands. Conditions required by the tree for successful natural reproduction are described, and directions are given for growing and transplanting the seedlings. The 7-page multigraphed leaflet, entitled "Yellow Poplar," is supplied on request by the United States Forest Service, Washington, D. C., and by the Central States Forest Experiment Station, Columbus, Ohio.

Wood Utilization Committee Reports on Tests with Scandinavian Gang Saws

Results obtained in tests made with Scandinavian gang saws in a Pacific coast lumber mill have recently been published by the National Committee on Wood Utilization, United States Department of Commerce. By arrangement of the committee, in order that these tests might be made Scandinavian manufacturers installed gang saws at the mills of the Tumwater Lumber Mills Co. (Inc.), at Olympia, Wash. The installation was completed in April, 1929.

The committee reports that the tests have proved the possibility of profitably manufacturing lumber from small logs 8 to 20 inches in diameter, and logs of low grade, such as under current logging practices are left by the loggers in large quantities in the woods of the Northwest. The explanation is the economy in operation offered by this type of gang saw, which requires less labor than the types of saw usually employed in this country and requires no skilled labor; the very large saving in raw material; and the smoothness and accuracy of the cut. Under certain conditions, it is reported, the gang-saw system will enable the American producer to increase by 15 or 20 per cent the portion of the tree which he converts into lumber.

Together with its 17 pages of text the report includes 11 photographs and drawings showing the design and method of operation of the gang saws, the layout of the mill, and details of the mechanical equipment used in conjunction with the saws.

Copies of this report may be obtained from the Government Printing Office, Washington, D. C., for 10 cents apiece.

The Forester as Versifier

In the 10 years since he published *The Forest Ranger and Other Verse*, John D. Guthrie, of the Portland, Oreg., district office of the United States Forest Service, has continued to keep an eye out for material of the sort which he collected and edited for that volume. Recently he has published a 321-page volume prepared on a similar plan and entitled "*Forest Fire and Other Verse*." The verses in this book have been chosen by Mr. Guthrie as reflecting in one way or another the life, work, and point of view of the American forest ranger or other forest worker. Many of them were written by rangers.

Leading themes are the charm of forests and mountains, the joy of life in the open, and the rigorous con-

ditions in which the ranger lives and works. The large element of humorous verse brings in the ranger's pet aversions such as routine reports, pack rats, and thoughtless forest visitors. As the title implies, forest fire predominates over other subjects. Versified warnings to the smoker and the camp-fire builder appear in abundance, many of which are well framed to win attention and stir the conscience. Fifteen pages are occupied by a group of "songs for foresters."

In following out his stated purpose Mr. Guthrie has voluntarily presented much that is faulty. Metrically, for example, the average grade of the collection is disappointing.

In a foreword to the volume Will C. Barnes testifies to its interest and to its historic value.

Trees of Illinois

By DORIS W. HAYES, United States Forest Service

A manual of 339 pages entitled "*The Native and Naturalized Trees of Illinois*"¹ has recently been published by the Illinois Natural History Survey as the fifth of a series of forestry bulletins publication of which began in 1910. The authors are Robert Barclay Miller, now chief forester of the State department of conservation, and L. R. Tehon, botanist of the natural history survey.

This bulletin is designed for use not only by teachers and students of botany and amateur botanists but by others interested in trees or in forest conservation; consequently the use of technical terms has been avoided as much as possible. More than 135 different kinds of trees are discussed, most of them in considerable detail. Accompanying the descriptions of species are 98 full-page photographic plates illustrating character of buds, leaves, twigs, and fruit, many smaller ones showing individual trees or timber stands, and outline maps of the State showing the distribution of the different species. The uniform procedure has been to give the scientific name and author, one or more common names, and a rather detailed botanical description. The nomenclature agrees with that used in the second edition of Sargent's *Manual of the Trees of North America*. Notes dealing with distribution of the species, its relations to environmental factors such as soil and topographical features, growth habits, and commercial value and uses, complete the discussion.

"Keys to the trees for the four seasons" have been contributed by William Trelease, emeritus professor of

¹ Vol. xviii, art. 1, Illinois Department of Registration and Education, Division of the Natural History Survey, Urbana, Ill., 1929.

botany, University of Illinois. These furnish a very practical means of readily establishing tree genera and of coordinating the characteristics of the four seasonal aspects of any given genus.

A section on the botany of trees includes careful directions for collecting and preparing specimens. These are well aimed to stimulate active interest and cooperation in collecting specimens and in accumulating and correlating data on distribution of species. This section includes about 30 photographs, mostly showing microscopic structure of various hard and soft woods.

The bulletin closes with a short history of the work of forest conservation in Illinois.

Bibliography of North American Forestry Literature in Preparation

The National Research Council and the United States Forest Service are cooperating in the preparation of a bibliography of North American forestry literature. It is proposed to prepare this bibliography on a plan much the same as that of the Catalogue of Publications Relating to Forestry in the Library of the United States Department of Agriculture, issued by that library in 1912. The catalogue of the Forest Service library will be used as the starting point for the new bibliography, but the work will include additional references indexed by other institutions. It is intended to include titles for all forestry material published in Canada, the United States, Mexico, the West Indies, and Hawaii prior to January 1, 1930.



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Circular 92, Forest Nursery and Planting Practice in the California Pine Region.

Miscellaneous Publications: 55, Pocket Guide to Alaska Trees; 61, Forest Plantations at Biltmore, N. C.

Map Folder, National Forests of California.
Forest Service Directory.

National Forest Administrative Maps: $\frac{1}{2}$ -inch, Huron, Medicine Bow, Uncompahgre; $\frac{1}{4}$ -inch, Gila, Huron, Medicine Bow, Pisgah, Uncompahgre, Wasatch, White Mountain; $\frac{3}{8}$ -inch, Nantahala; $\frac{1}{12}$ -inch, Tongass; 1 : 50,000, Luquillo.

National Forest Proclamation Diagrams: $\frac{1}{4}$ -inch, Pisgah, White Mountain; $\frac{3}{8}$ -inch, Nantahala.

Atlas Folio, 3-color, Caribou National Forest.

